



**INTERNATIONAL EDUCATION SERIES.**

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**EDUCATION**  
**FROM A NATIONAL STANDPOINT.**

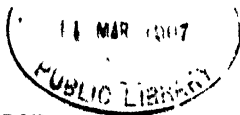
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**REFERENCE**

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## TRANSLATOR'S PREFACE.

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IT is now more than three centuries since the "up-rising and reinstatement of Hellenism," with its new conceptions of life, revolutionized the thought of Europe. To the change in the existing order of things at that time we have a parallel at the present moment. The last half-century has seen the triumph of the scientific method, and the impulse given to modern thought by the invasion of the positive spirit has produced a *malaise pédagogique*, which is now reaching an acute stage. The spirit of reform is in the air. The question of the retention of Greek at the universities is but a ripple of the great wave that seems ready to burst upon us and to obliterate the characteristic features of our national system of education. The pressure of a complex civilization has introduced new elements into the problems perplexing the statesmen of the day, and has given fresh impetus to the impending change. A glance at the various forms of the educational systems obtaining in Europe and America is sufficient to betray to the observant eye how near to the verge of chaos we are standing. Questions of special interest are constantly arising, and in the excitement of the moment we are

apt to place them in a false perspective, to exaggerate or to minimize their relative importance, and so we run the danger of ignoring or treating with indifference those fundamental principles which are of infinitely greater importance than anything of merely temporary interest. The present conflict between the claims of a literary and of a scientific curriculum in our secondary schools is an instance in point. Everywhere we see the tendency of scientific and commercial studies to thrust what is more disinterested into the background. Grave as were the faults of the old *régime*, an impartial and dispassionate survey of the results of the purely scientific system does not seem to warrant the perfervid encomiums of its supporters. The investigations of Mr Glazebrook, the Head Master of Clifton, into the post-university career of science "scholars" at Oxford and Cambridge, lead him to conclude that there is "a very marked advantage on the side of those who had the more liberal education." \* Similar inquiries elsewhere lead to the conclusion that the powers of observation, correlation, and inference are not as fully developed by this training as was anticipated, and that the mere erudition so frequent and so fatal in the classical system is equally fatal and equally frequent in a scientific training. It looks as if the "modern" system is after all but a system of imparting information—"the least part of knowledge," as Butler tells us. This is the kernel of the whole matter. And, if it be true that the "modern" system effectually stifles what is more important than knowledge itself—the desire for know-

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\* *Thirteen Essays on Education* ("The Universities and Specialization," p. 231).

ledge—the indictment is a serious one. The result of this feeling is that, abroad, at any rate—for in this country we move slowly—there is felt the discomfort that, as Locke says, underlies every desire for change. France, Germany, and Italy are convulsed by the shock of the two opposing forces of Humanism and Realism. In this country we seem quite content with having supplemented the “classical side” by a “modern side,” and we cheerfully throw the *onus* of choice between these alternatives upon the parents—who in most cases are the least competent to make that choice wisely. But abroad, the State has organized the secondary education of the whole community, and the theoretical and practical difficulties of an exceedingly complex problem have been forced upon the attention of statesmen who, with or without the necessary qualifications, have had to attempt at least a provisional solution. At home the voice of Matthew Arnold has been crying to us from the wilderness: Organize, organize your secondary education! Your middle-class education must be a public service with the organization and guarantees of a public service, with the honest, single-minded, logically pursued aim of efficiency. But our Cassandra was ignored. Alone of the great European powers we leave our secondary education to the energy and enterprise of the individual. We have no definite centre of responsibility. Our efforts are spasmodic and ill-directed. We have devised a scheme of technical instruction which can effect but little until our system of primary instruction is reformed and extended, for the former is intended to aid the masses whose minds have been lying fallow from the age of twelve or thirteen. The University Extension

scheme has failed to touch the masses for the same reason; it brought "caviare" to "the general" by means of a picked body of men who, as a rule, are too inexperienced and unsympathetic to be able to make the untimely food palatable. Not attempts such as these, not people's palaces, polytechnics, and the host of forms which philanthropic endeavour has assumed in our large towns, are the crying need of the hour, but a sound organization of our secondary education. The longer our recognition of this is postponed the more difficult and costly will action become. When we do recognize it, our statesmen will have to discuss in sober earnest the question which is being fiercely debated at the present moment by the statesmen, *savants*, and *littérateurs* of Europe—What is the proper basis of a secondary education?

The rivalry between the *gymnasium* and *realschule* has its counterpart in France in the conflict between the classical *lycées* and the *écoles spéciales*. The struggle has been intensified in the latter country by the descent into the arena of a third group of combatants, advocating what is not a compromise but a rival scheme, under the name of *enseignement classique français*. The parties engaged in this triangular duel are by no means agreed, even when they profess to be directing their efforts to the same end. Some vigorously condemn any form of education that is not based upon both Greek and Latin. Others, to the gratification of the clergy, pronounce boldly in favour of a radical change, which must in the long run involve the relegation of both Greek and Latin to the *écoles libres*. M. Bigot, for example, insists on much the same bifurcation as that obtaining in Germany, viz. an *enseignement classique* of Greek and Latin, or

of Latin alone. So far, all indignantly denounce the technical or professional side proposed for the secondary schools.\* M. Dietz would make "modern humanities" the basis of all secondary education.† Most daring of all is M. Raoul Frary,‡ and he is the more formidable because, a scholar of exceptional brilliancy, he fights with weapons forged in the armoury of his opponents. Nothing will content M. Frary but the suppression of Latin and Greek. *Delenda est Carthago!* Such are a few instances of the ideas afloat in France at the present moment. But these, on the whole, treat the subject far too much from the utilitarian point of view. Looking at the question of education from a wider standpoint, the late M. Guyau has joined in the discussion with a contribution which, from the very nature of its conception, has given a higher tone to controversy.§ The present volume is so closely linked with that of M. Guyau, both in object and method, that in attempting to give the reader an idea of the part played in the discussion by M. Fouillée, it will perhaps be advisable to state the scope of the work of the younger philosopher.

In all that Guyau wrote he kept one single end in view, "the linking together of ethics, æsthetics, and religion with the idea of *life*—life in its most intensive, extensive, and therefore most fruitful form." To him pedagogy is "the art of adapting new generations to those conditions of life which are the most intensive, ex-

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\* "Questions d'enseignement secondaire" (1886)

† "Études Classiques sans Latin" (1886). "Les Humanités Modernes" (1887).

‡ "Question du Latin" (1886).

§ "Education and Heredity. A sociological study." Contemporary Science Series, 1891. (Walter Scott.)



tensive, and fruitful for the individual and the species." The claims of the individual and of society are complementary, each is necessary to the fullest development of the other. The object of all education is simultaneously individual and social, it is "the search for means to bring the most intensive individual existence into harmony with the most extensive social life." It therefore has a triple end: (1) "The harmonious development in the individual of all the capacities proper and useful to the race;" (2) "The development in the individual of such capacities as are peculiar to him," as long as such development "will not disturb the equilibrium of the organism;" (3) "To arrest and check the tendencies and instincts which may disturb that equilibrium, *et* to aid heredity in proportion as it tends to create permanent superiority in the race, and to resist its influence when it tends to accumulate causes pernicious to the race itself." The freshness and ingenuity of Guyau's treatment of the problem in this form can be readily imagined by those who are familiar with his works on other subjects. An ardent evolutionist, he carries his doctrine to its logical consequences. "The whole system of education must be directed towards the maintenance and progress of the human race." "Every individual is a temporary depository of part of the force inherent in the race;" and Guyau's special claim to attention lies in his endeavour to show that the system of education best adapted to conserve the force of the race is also the best adapted to conserve the force stored up in the individual. The heads of the argument may be roughly stated as follows. The individual is a society composed of constituent cells; hence "life" and "social life" are contro-

veritable terms. The maintenance of the solidarity between the individual and the race is the only hope for the future of both. The education best adapted to secure the maintenance of this solidarity, upon which the persistence of the race depends, is that based upon the *Humanities*. The modern system, based upon science, is sterile, because it neglects the humanities contained in science, and science is only valuable from the humanities contained in it.

So far are we led in M. Guyau's posthumous work. In M. Fouillée's opening chapters we find a brilliant application by analogy of the doctrine of *selection* to physical, intellectual, and moral education—an application as novel, ingenious, and stimulating as the analogical application by Guyau of the principle of "rotation of crops" in agriculture to intellectual education.\* Particularizing from the race to the nation, M. Fouillée treats the subject of secondary education from the national standpoint. But although he has narrowed down Guyau's main thesis, the author does not present us with a mere supplement to "Education and Heredity." An experienced teacher, and one of the leading philosophers in France, his opinions on the burning question of the hour acquire additional weight at the present crisis. His eloquent exposition of the *humanities* contained in science,† his crushing indictment of the utilitarian tendency that confounds education with instruction, his damaging criticism of the educational doctrines of Mr. Herbert Spencer and Professor Bain,‡ his able

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\* "Education and Heredity," c. viii.

† It was once said of Professor Tyndall's lecture on "The Scientific Use of the Imagination," that it was really a lecture on "the imaginative use of science." What was meant as a quip had a mine of truth in it.

‡ The student should read in this connection M. Thamin's excellent monograph, "Education et Positivisme" (1892).

and temperate exposure of the fallacies that<sup>o</sup> have found utterance during the present controversy, his luminous and convincing restatement of the arguments for the retention of the *humanities* as the basis of any system of secondary education, his grasp of detail as shown in the tables throughout the volume, and finally, the fact that the recent changes in the curriculum of the secondary schools in Italy have been on the lines laid down in this volume by M. Fouillée, may well give us pause.\*

I must express my deep sense of the courtesy and generosity of M. Fouillée, who gave me *carte-blanche* to retrench the French edition where necessary, and to adapt it for the English and American reader. After due consideration I decided to omit just so much of the detail as would be irrelevant to the reader in this country or America, and also whatever would necessitate voluminous elucidation in footnotes. The main argument remains intact. The reader should bear in mind that the *baccalauréat* corresponds to the degree examinations at the British universities rather than to their matriculations. Wherever timetables are given, I have added the average age of the classes for which they are intended. M. Fouillée's tables can therefore be readily applied to boys of the same average age elsewhere. I have taken the liberty of inserting a few references that may be useful to the student of pedagogy.

W. J. GREENSTREET.

\* THE MARLING SCHOOL, STROUD,  
March, 1892.

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\* The Italian government has practically adopted the compromise suggested by M. Fouillée between the conflicting claims of the classics and natural science, and has reorganized and co-ordinated the subjects taught in its secondary schools.



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## EDUCATION

# FROM A NATIONAL STANDPOINT.

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### INTRODUCTION.

A SOCIETY has been formed in France for the promotion of a physical *renaissance*; it is a matter of general opinion that combination is no less necessary for the promotion of an intellectual and moral *renaissance*. Educational questions are the order of the day; rarely have so many books been published with reference to problems in pedagogy. Most of the controversies relative to this vital question of education seem to me to arise from the fact that we fail to reach a sufficiently general point of view, *i.e.* the national, international, or even *ethnical*. Among books recently published and deserving of notice on various grounds, there is, I may almost say, only one in which the author places side by side the two essential factors in this problem—the individual and the race.\* On this, as on all great questions of practical philosophy, Guyau has left his mark. His principal claim on our attention will be that he has treated from the “sociological” point of view the problems, not only of

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\* “Education and Heredity :” Contemporary Science Series.



## 2 EDUCATION FROM A NATIONAL STANDPOINT.

morals, but also of religion, aesthetics, and education. He has treated the question from the highest standpoint, and has stated it in a strictly scientific form: "Given the hereditary merits and faults of a race, how far can we modify existing heredity by means of education for the benefit of a new heredity?" For the problem is nothing less than this; it is not merely a matter of the instruction of individuals, but of the preservation and improvement of the race. Education must therefore be based upon the physiological and moral laws of the culture of races. These laws are not considered unworthy of attention when we are dealing with the breeding of animals; but they are set aside or forgotten when we are dealing with man, "as if the education of humanity only concerned individuals." The ethnical is the true point of view. By means of education we must create such hereditary tendencies as will be useful to the race, both physically and intellectually. True education is that which, instead of sterilizing the brain by the exhaustion of its force, makes it more and more fruitful by the development of varied capacities in the midst of varied environments.

In the following pages I propose to take a more restricted view of the problem than that taken by Guyau; I shall devote myself in particular to educational questions, which I shall discuss from the national point of view. The nation is an organism endowed with a kind of collective consciousness, although not concentrated in an *ego*; I therefore take everything that maintains in a nation continuity of character, mind, habits, and aptitudes—in a word, a national consciousness and a national will—as a form of organic heredity and identity persisting from age to age. That strange saying of old Heraclitus has been rightly applied to the solidarity of the generations of mankind: "The death of the gods is our life;" i.e., according to ancient modes of speech, we are living on our ancestors, on the moral forces incarnated in the history of our country, as well as on the natural forces incorporated in its climate and in its soil. In my opinion, the final goal of education is to secure, not only

the development of the race, but also that of our nationality, our native country.

Among the means of attaining this end which we have to consider, the first is *selection*. The history of humanity exhibits the struggle of races, nationalities, and individuals, not only for existence—in the oft-quoted phraseology of a narrow interpretation of Darwinism—but also for vital progress of every kind, including intellectual, æsthetic, and moral life. Much is said in these days about the struggle for existence. There is a hasty and heedless application to humanity of the laws formulated by Darwin for the animal kingdom. The metamorphoses of selection, as it passes from the domain of brute force to that of intellectual and moral force, are ignored. All the more or less shocking deductions drawn from Darwinism are due to this logical blunder, and consist in the belief that the triumph of the most powerful force is always equivalent to that of the most brutal force. It is of importance, therefore, to note the analogies and differences between natural and social selection; these I shall attempt to point out. In the first place, we must endeavour to ascertain the true power and limits of education and of instruction, strictly so called; we shall investigate how far it is true that “ideas lead the world,” and how a selection of ideas is primarily affected in the brain by education, *i.e.* what we may call psychological selection. Then we shall discuss social selection and the conditions under which it will produce such a picked class as is necessary to the progress of the whole race. Here the doctrine of evolution will assist us to determine the most essential objects of that education which has as its aim the perfection of the species.

Having thus laid down our general principles, we shall draw our theoretical and practical inferences as far as reform of the educational systems of Europe is concerned. The more civilization advances, the more pre-eminence lies with everything that is organized, systematized, and co-ordinated in hierarchic order. From the military point of

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view, for instance, the more numerous the army, the more essential is the unity and subordination of those parts which are distinctive of a living being. From the political point of view, it is equally clear that organization is of vast, and so to speak of vital, importance. The danger that, above all others, a democratic nation must avoid is the disintegration of society into units with no immediate concern but self-interest, into individuals to whom social duties and bonds are gradually ceasing to appeal. Is not the same danger to be anticipated in education? There, as elsewhere, we must battle all the more vigorously against anarchy and want of organization, in proportion as the number of subjects of knowledge becomes more numerous and more complex; science and industry are advancing with such rapid strides that the human brain cannot, save by more and more rigorous discipline, adapt itself to such a variety of laws, theories, and applications. That nation which can introduce into its education the most powerful and the most consolidated organization will, *ipso facto*, enjoy in the world of intellect a superiority analogous to that of well-organized governments and armies.

Reform has, so far, been chiefly confined either to the subjects taught or to the methods employed in teaching the various literary and scientific subjects; no attempt has been made to harmonize and unify education as a whole; in fact, the systems at present obtaining in Europe do not seem to have found their true centre of gravity. Some want the basis of education to be scientific, others literary; the latter, again, may be subdivided into the partisans of ancient and of modern languages. In this volume we shall inquire if the link between science and literature is not to be found in the knowledge of man, of society, and of the great laws of the universe, *i.e.* in morals, social science, and æsthetics—in a word, in philosophy.

This idea is becoming more and more familiar; of this the recent reforms in education in Italy are a fresh proof. It has already been suggested in France that instead of

being relegated to the last year of school life, the course of ethics, logic, æsthetics, and general philosophy should be introduced, in their more elementary form, as early as the ages of fourteen to sixteen. This new system has just been inaugurated in Italy ; psychology, logic, ethics, and general philosophy are taught in the three highest classes of the lyceums. In France, too, a proposal has been made to include in the teaching of each of the special sciences—physics, physiology, history, etc.—the study of their philosophical principles and general conclusions. The new Italian code gives a place, principally in natural science, to general and philosophical questions. This is, then, a first attempt in the direction of a philosophical organization and co-ordination of subjects. But as the code was drawn up in an exclusively positivist spirit, certain principles, which to my mind are essential, have been unwisely sacrificed.

Of one thing, however, we may feel convinced—that a new group of sciences, *i.e.* social science, is extending its limits, and by the next century will have been awarded the first rank in importance. Too exclusively literary an education having provoked a reaction in favour of science, and scientific education in its turn having disappointed expectations, we may fairly prophesy that, in the more or less near future, the characteristic feature of education will be the moral and social tendency given from the outset to all subjects and to all methods ; this will *ipso facto* be systematization instead of the present vicious condition of affairs, which is generally known by the barbarous names of “particularizing,” or “specializing.” The “humanities,” in the true sense of the word, which should be based upon the knowledge of man and human societies, will then be brought to the front. The humanities, with the philosophy which completes them, form the true and the only liberal education. In each of us must be “a free man,” who keeps his freedom unimpaired by the ever-increasing servitude of life, able to communicate to industry itself, and to material labour of every kind, something of that “dignity” which, according

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to Plato and Aristotle, "comes with knowledge and thought." We must each of us feel that we are citizens ; we must be animated by public spirit, always ready to place the interests of our country above those of self, above our own work and industry, above our business and our wealth. To obtain this twofold result, a liberal education was always considered a *sine quâ non*, and it was supposed that for the dominant class it should be as extended in character as possible. I shall endeavour to determine accurately the necessary bases of such an education, truly humane and at the same time national ; for that purpose I shall discuss the problem not merely, as is usually the case, from the standpoint of vague and general pedagogy ; I shall transfer the question to the ground of present reality, into a given environment—the modern—and a given nation—French or English, as the case may be.

A nation, like an individual, has its own instinct and genius.

It has the more or less vague sense of its "mission" to humanity.

If social science rejects every mystical interpretation of the common spirit animating a nation, it by no means rejects the reflected consciousness or spontaneous divination possessed by every nation of the functions which has devolved upon it. History furnishes us with ample proofs of this ; the Jews were not the only people who believed, and rightly believed, that they were chosen to transform the world ; the Greeks considered their mission to be the propagation of the arts and sciences ; Rome claimed the dominion of the world—even when invaded by barbarians she still was queen ; and finally, when deprived of her temporal power, she reduced the universe to spiritual servitude by the establishment of the Papacy. The English claim that their destiny is to rule the sea, and to found colonies in distant lands. Americans are fond of representing their country as a theatre for the trial and development of liberty in every form and in every direction of speculative and practical life ;

scarcely an American can be found who has not in his mind, in a more or less nebulous form, this idea of illimitable individualism and indefinite expansion. We know the Germany of to-day believes in her scientific and political mission, just as in the time of Luther she believed in her religious mission. As for France, her belief in the universal triumph of reason, law, and fraternity is a commonplace. France prides herself on being, *par excellence*, the focus of those ideas and sentiments which in the true sense of the word are *humane*; she is the country of "humanity," in the broad sense in which the fifteenth century understood the word. Her classical literature and art form a literature and an art of an entirely human and universal expansion; she is pre-eminently the classic land, the land of the "humanities." The first duty of every French government is to maintain, in the education it provides for the nation, the literary and artistic honour of France, and her faith in a profoundly human morality and philosophy.

Above all, a great nation like France must foster the production and selection of the highest genius, or even of simple superiority. How, then, is genius born and developed? By the combination of three factors: (1) The hereditary transmission of the qualities of the race, and in particular of the family; (2) The "happy accidents" and peculiar circumstances of spermatocytic or embryonic life; (3) The influence of the national environment and of national education. We have no control over the embryo or over those chances which by a precious *idiosyncrasy* virtually create a genius; but we can do something, we can even do a great deal, to prepare for the advent of minds of a higher order, by the accumulation of certain qualities in the race, and by the maintenance of that intellectual and æsthetic environment which is, as it were, the vital air of genius.

An evolutionist has justly remarked, *à propos* of adaptation to environment, that in Greece, where every god had his own temple, every temple its statue, every house its altar, and every altar its minor divinities; in Greece, "where

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marble was as common as brick in London," and where sculptors were as numerous as carpenters, we can understand how a Phidias was born and found admirers, while, on the other hand, he could not have been born in Germania. So in Italy, where from the earliest times nymphs and satyrs have been portrayed, succeeded in later days by Madonnas and St. Sebastians; where little chapels have always been hung with votive offerings to Venus Genetrix or to Our Lady of the Sea; where countless generations of artists decorated the walls of Pompeii, or covered with rapid frescoes the commonest ceilings of Florence and Genoa; need we wonder that a country, where a lofty level of taste and artistic finish was thus developed, should have produced a Leonardo da Vinci and a Raphael? On the other hand, why has America produced an Edison, a Morse, a Bell, a Fulton, but no Schiller, Mozart, or Michael Angelo? The reason is easily discovered both in the hereditary and in the existing national environment. Do we wish France to remain the land of letters, painting, disinterested scientific investigation, and philosophy? We must be careful lest we reduce the classical *élite* to a few; for then the production and selection of genius or simple superiority will be impossible. We want, as I shall show, a field of culture of sufficient extent for the national mind to expand in every direction of intellectual work—of literature, art, and science. France must be literary, scientific, and artistic, if Frenchmen are to be literary, scientific, and artistic; if they are to maintain their influence and glory as a nation. If France chooses to become "Americanized," she will perhaps cease to be France, but she will certainly never become an America.

The classics are already the pledge of a certain disinterestedness, of a certain literary taste; even Latin, "apparently useless," is useful in turning the minds of the young from their immediate or future interests—personal interests—in carrying them back to great national and

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\* *Vide* Grant Allen, "Idiosyncrasy" (*Mind*, 1883, p. 500).

historical interests, to French literature and to the ancient literature by which it was inspired, to that ancient art from which our modern art still derives its inspiration. That is *Gallia Perennis*, beginning with Rome or earlier still, instead of "commencing with the French Revolution."\*

Democracy having already betrayed only too strong a tendency to utilitarianism and industrialism, the State, far from removing the obstacles in the path of all who have not gone through a full course of the "humanities," should, on the contrary, do its utmost to favour the selection and constitution of a really liberal *élite*; this is its duty and its right, especially in republics, in which, in the interest of all, this guiding influence should be in the hands of men whose minds are of the highest order, who are superior to the interests of the moment, who are least affected by purely utilitarian tendencies, and most capable of perpetuating from generation to generation that historical and permanent national spirit which constitutes the true "national will."

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\* An allusion to the fanaticism which advocates that school text-books of French history should begin with the French Revolution. *Vide* Guyau's "Education and Heredity," p. 227 (*Tr.*).



# BOOK I.

## EDUCATION AND SELECTION FROM THE NATIONAL POINT OF VIEW.

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### CHAPTER I.

#### *POWER OF EDUCATION AND OF IDEA-FORCES—SUGGESTIONS—HEREDITY.*

THE power of instruction and education, denied by some and exaggerated by others, being nothing but the power of ideas and sentiments, it is impossible to be too exact in determining at the outset the extent and limits of this force. This psychological problem is the foundation of pedagogy.

I. The principle I assume at the outset is one that I have developed elsewhere,\* that every idea tends to act itself out. If it is an isolated idea, or if it is not counter-balanced by a stronger force, its realization must take place. Thus the principle of the struggle for existence and of selection, taking the latter word in its broadest sense, is in my opinion as applicable to ideas as to individuals and living species; a selection takes place in the brain to the advantage of the strongest and most exclusive idea, which is thus able to control the whole organism. In particular,

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\* "Evolutionisme des idées-forces."

the child's brain is an arena of conflict for ideas and the impulses they include; in the brain a new idea is a new force which encounters the ideas already installed, and the impulses already developed therein. Hence I maintain that education as a whole is a work of intellectual selection. I have elsewhere stated the principal facts that demonstrate the impelling force of ideas. Assume a mind, as yet a blank, and suddenly introduce into it the representation of any movement, the idea of any action—such as raising the arm. This idea being isolated and unopposed, the wave of disturbance arising in the brain will take the direction of the arm, because the nerves terminating in the arm are disturbed by the representation of the arm. The arm will therefore be lifted. Before a movement begins, we must think of this; now no movement that has taken place is lost; it is necessarily communicated from the brain to the organs if unchecked by any other representation or impulse. The transmission of the idea to the limbs is inevitable as long as the idea is isolated or unopposed. This I have called the law of idea-forces,\* and I think I have satisfactorily explained the curious facts in connection with the impulsive actions of the idea.† The well-known experiments of Chevreul on the “pendule explorateur,” and on the divining rod, show that if we represent to ourselves a movement in a certain direction, the hand will finally execute this movement without our consciousness, and so transmit it to the instrument. Table-turning is the realization of the expected movement by means of the unconscious motion of the hands. *Thought-reading* is the interpretation of imperceptible movements, in which the thought of the subject betrays itself, even without his being conscious of it. In the process that goes on when we are fascinated or are on the point of fainting, a process more obvious in children than in adults, there is an inchoate movement which the paralysis of the will fails to check. When I was a lad,

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\* “Evolutionisme des idées-forces,” bk. iii.

† Ibid. bk. iii.

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I was once running over a plank across the weir of a river, it never entering my head that I ran any risk of falling; suddenly this idea came into play like a force obliquely compounded with the straight course of thought which had up to that moment been guiding my footsteps. I felt as if an invisible arm had seized me and was dragging me down. I shrieked and stood trembling above the foaming water until assistance came. Here the mere idea of vertigo produced vertigo. A plank on the ground may be crossed without arousing any idea of falling; but if it is above a precipice, and we think of the distance below, the impulse to fall is very strong. Even when we are in perfect safety we may feel what is known as the "fascination" of a precipice.\* The sight of the gulf below, becoming a fixed idea, produces a resultant inhibition on all other ideas. Temptation, which is always besetting a child because everything is new to it, is nothing but the power of an idea and its motor impulse.

The power of an idea is the greater the more prominently it is singled out from the general content of consciousness. This selection of an idea, which becomes so exclusive that the whole consciousness is absorbed in it, is called *monoïdeism*. This state is precisely that of a person who has been hypnotised.† What is called hypnotic suggestion is nothing but the artificial selection of one idea to the exclusion of all others, so that it passes into action. Natural somnambulism similarly exhibits the force of ideas; whatever idea is conceived by the somnambulist, he carries into action. The kind of dream in which children often live is not without analogy to somnambulism. The *fixed idea* is another instance of the same phenomenon, which is produced in the waking state, and which, when exaggerated, becomes monomania, a kind of morbid monoïdeism; children, having very few ideas, would very soon acquire fixed ideas,

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\* Bain, "Mental Science," p. 91 (*Tr.*).

† "Evolutionisme des idées-forces," bk. iv. *Vide* Guyau, "Education and Heredity" (Walter Scott), pp. 14, 23 (*Tr.*).

if it<sup>o</sup> were not for the mobility of attention which the ceaseless variation of the surrounding world produces in them. Thus all the facts grouped nowadays under the name of auto-suggestion may, in my opinion, be explained. Here we shall generalize the law in this form : every idea conceived by the mind is an auto-suggestion, the selective effect of which is only counterbalanced by other ideas producing a different auto-suggestion. This is especially noticeable in the young, who so rapidly carry into action what is passing through their minds.

The force of example, which plays so important a part in education, is likewise reducible to the communicative and selective force of every representation. In fact, we explain in the same way the second form of suggestion, that in which an act is suggested not to one's self, but to others by means of an idea. Perhaps the most interesting part of Guyau's researches is his exhaustive treatment of suggestion and its *rôle* in education.\* Guyau was, I believe, the first to point out the close analogy between suggestion and instinct, with the possible application of suggestion to moral therapeutics, "as a corrective of abnormal instincts, or as a stimulant of normal instincts which are too weak." "Every suggestion is a nascent instinct wholly created by the hypnotiser."† Since these words were written, the therapeutic results of suggestion have been numerous and important. By suggestion, Doctors Voisin and Liégeois have cured melancholia, dipsomania, morphinism, drunkenness, and excessive indulgence in tobacco. M. Delboeuf asserts that he has made a timid girl brave. M. Voisin transformed the character of a woman who was idle and dishonest ; he also claims to have changed a married woman, who had made domestic life unbearable to her husband, into a gentle and affectionate wife. This would have been a boon to Socrates, for instance. Finally, M. Liébault, of

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\* Vide "Education and Heredity," pp. 23, *et seq.* (Tr.).

† Ibid. p. 5 (Tr.)

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Nancy, cured a lad of incorrigible idleness for six months.\* It is needless to say that Guyau does not advise, and even expressly condemns, any introduction of hypnotism into normal education ; it is far better, as he says, "to leave the boy in idleness than to make him a neuropath." His object in quoting pathological facts is merely for the purpose of deduction as to the normal state. In Guyau's opinion, hypnotic suggestion is nothing but the morbid exaggeration and artificial intensification of suggestive phenomena produced in a state of perfect health.

Normal suggestion, which is the only suggestion that should be used in education, is psychological, moral, and social ; it consists in the transmission from one individual to another of ideas or impelling sentiments, and in the possibility of rendering these ideas or sentiments permanent. We are not, in the normal state, controlled by a particular magnetiser, but it by no means follows that we are not "accessible to a multitude of small suggestions, at one time at variance, at another accumulating and producing a very sensible mean effect." Children, in particular, are open to every suggestion of the environment. Guyau shows that, from the moment it enters into the world, the child's condition may be compared to that of a hypnotized subject. There is the same absence of any ideas of its own, or the same dominance of a single idea. "Everything that the child sees or feels will be a suggestion ; this suggestion will give rise to a habit the effect of which will sometimes persist throughout the whole of life, just as impressions of terror excited in children by nurses may persist." If the introduction of new sentiments is possible by wholly physiological means, it should be equally possible by moral psychological means. Hence the importance of the fact that "recent studies in the nervous system seem likely to correct scientific prejudices against the power of education as science becomes more perfect." Suggestion, which

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\* "Education and Heredity," pp. 9, 10 (Tr.).

create artificial instincts capable of counterpoising hereditary instincts, constitutes a new power comparable to heredity; now education, as Guyau says, "is a totality of co-ordinated and reasoned suggestions, and we can therefore understand the importance and efficacy it may acquire from the physiological and psychological point of view."\*

In my opinion, suggestion is only a particular case of the most fundamental law of idea-forces, the law which dominates all pedagogic science, and to which the author of "Education and Heredity" has made in several chapters of that work a very important contribution.

Ideas are sometimes considered of little consequence, and are supposed to have scarcely any influence upon the conduct. On the other hand, the philosophers of the seventeenth century, with Descartes and Pascal, considered sentiments and passions as indistinct thoughts, as "thoughts, as it were, in process of precipitation." This is true. Beneath all our sentiments lies a totality of imperfectly analyzed ideas, a swelling stream of crowded and indistinct reasons by the momentum of which we are carried away and swept along. Inversely, sentiments underlie all our ideas; they smoulder in the dying embers of abstractions. Even language has a power because it arouses all the sentiments which it condenses in a formula; the mere names "honour" and "duty" arouse infinite echoes in the consciousness. At the name of "honour" alone, a legion of images is on the point of surging up; vaguely, as with eyes open in the dark, we see all the possible witnesses of our acts, from father and mother to friends and fellow-countrymen; further, if our imagination is vivid enough, we can see those great ancestors who did not hesitate under similar circumstances. "We must; forward!" We feel that we are enrolled in an army of gallant men; the whole race, in its most heroic representatives, is urging us on. There is a social and even an historical element beneath moral ideas.

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\* *Vide* "Education and Heredity," p. xxiv.

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Besides, language, a social product, is also a social<sup>n</sup> force. The pious mind goes further still; duty is personified as a being—the living Good whose voice we hear.

Some speak of lifeless formulas; of these there are very few. A word, an idea, is a formula of possible action and of sentiments ready to pass into acts; they are “verbs.” Now, every sentiment, every impulse which becomes formulated with, as it were, a *fiat*, acquires by this alone a new and quasi-creative force; it is not merely rendered visible by its own light to itself, but it is defined, specified, and selected from the rest, and *ipso facto* directed in its course. That is why formulas relative to action are so powerful for good or evil; a child feels a vague temptation, a tendency for which it cannot account. Pronounce in its hearing the formula, change the blind impulse into the luminous idea, and this will be a new suggestion which may, perhaps, cause it to fall in the direction to which it was already inclined.\* On the other hand, some formulas of generous sentiments will carry away a vast audience immediately they are uttered. The genius is often the man who translates the aspirations of his age into ideas; at the sound of his voice a whole nation is moved. Great moral, religious, and social revolutions ensue when the sentiments, long restrained and scarcely conscious of their own existence, become formulated into ideas and words; the way is then opened, the means and the goal are visible alike, selection takes place, all the volitions are simultaneously guided in the same direction, like a torrent which has found the weakest point in the dam.

Conduct, therefore, depends in a great measure on the circle of ideas formed by each individual under the influence of experience, social relations, or of his intellectual and æsthetic culture. Every man eventually possesses a totality of general notions and *mazims* which become the source of his resolutions and actions, because the whole is blended

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\* Guyau gives numerous interesting examples of this. *Vide* Ibid. pp. 19, *et seq.* (Tr.)

into a<sup>\*</sup> sentiment and into a habit. Even in children the tendency to *maximation* is manifest, because a maxim is a generalization which satisfies the thought.\* If, then, there is a break in the circle of ideas at any important point, if into that circle false notions or immoral maxims have gained entrance, we shall become feeble and vicious, as in the case of a nation whose fundamental laws are immoral. The various mental faculties of an individual are developed, like his physical faculties, in a relation of reciprocal action, but intellectual activity is more *independent* than the rest. If you have false ideas on a point of fact or reasoning, I may in a few moments put your finger on your own error or convince you by proof; but to modify a sentiment, tendency, or habit is a matter of months or years. The intellect is therefore more flexible, mobile, and progressive than the rest of our constitution; hence we can act upon it the more readily. Give a person suffering from myopia the glasses which make objects visible to him; he is compelled to admit that he sees these objects. Show an ignorant person a drop of water under the microscope, and he will be compelled to admit that the drop of water is inhabited. The intellect is to the other mental faculties what the eyes are to the organs of our body—touch at a distance. It follows that intellectual activity has superior power in the direction and transformation of other kinds of activity. As it discloses new aspects of things it produces thereby a double effect—it excites new sentiments, and opens new ways to action. Every new idea tends to become a sentiment and an impulse, and therefore an idea-force. The intellect is the great instrument of voluntary selection. It is an abbreviated means of evolution, accelerating and accomplishing in a few years the selections which without its aid would have taken centuries to effect.

Now let us pass from the individual to the social organism. There again the different activities and products of civiliza-

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\* Guyau, "Education and Heredity," p. 109 (Tr.).



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tion are reciprocally related; but the products of the intellect and science stimulate and direct all the other social functions. Religious, moral, æsthetic, political, and economical creations are determined by the progress of humanity in the real knowledge of things or in the discovery of ideas. Instruction is a motor of primary importance in the social mechanism; but subject to one condition—that it is brought to bear upon really directive and selective ideas, on those ideas which from their intricate connection with sentiment and volition are happily termed *idea-forces*.

II. The exclusive partisans of heredity do not perceive that their doctrine is vitiated by a contradiction that seems to have escaped notice. They impress upon us that the fundamental law of heredity is that of regression to the average, and they do not see that for that very reason heredity tends to neutralize the effects of its own action—in so far as they are exceptional—in order to give place to agencies other than its own.

From his ingenious statistics on heredity, Galton deduces an important law which he calls “*regression to the average*.”\* Great deviations are always exceptions, and the average type very soon reappears. Take at random two large groups of persons in ten different generations, and compare their stature. The average stature of the groups will be the same, because the child inherits not only from his parents but from his ancestry. Now, says Galton, there are so many elements of every kind blended in the ancestry of a given individual, that this ancestry in its totality is indistinguishable from a sample taken at haphazard from the general population. The average stature of his ancestors will become identical with that of the population.

As the average statures of your ancestry and mine are identical, deviations in stature are due to chance and the combinations of the most intimately connected heredities;

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\* “*Natural Inheritance*,” p. 95, *et seq.* (*Tr.*).

in the great mass of the population, deviations are neutralized and differences disappear. Assuming this, let us suppose that a particular system of physical education is capable of giving a very sensible increase to the stature of individuals subjected to this *régime*; the effects of heredity upon the stature of an individual being minimized in the case of the majority at the moment of birth, it follows that it would be possible to increase the stature of successive generations by a wide distribution of this education. If the partisans of heredity object that—"The laws of nature are inevitable; given a father and mother and a grandfather and grandmother of a certain stature, the calculation of probabilities may determine in advance the probable stature of the children,"—we may answer—"Since your inevitable laws result in the triumph of the average, in the levelling of exceptions, in the reduction of the height of the tall and its increase in the short, do not you see that these laws leave the field open to the action of education?"

Take as our starting-point an exceptional individual, and ascend or descend the direct or collateral line; we shall find that those who are in immediate juxtaposition to him are still exceptional, but not so exceptional as he is; after two or three steps of this kind we shall see that these exceptional characteristics have almost vanished, and that the sum total of the near family relations is not essentially different from that of a number of ordinary persons taken at random. Further, as a matter of fact, the really exceptional individuals are the exceptional children of ordinary parents, and the ordinary children of exceptional parents. This theory is destructive of all prejudices with regard to noble blood. People imagine that the "blood of the Howards" flows without intermixture from generation to generation, because of the constant emergence of the same characteristic qualities; but remember that we have mothers as well as fathers, and that every factor contributes almost equally to the result, and we shall see that the general characteristics of your ancestors to the tenth degree, for instance, will be

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very much the same as those of the ancestors of anybody else. To this there are but two exceptions or restrictions; by marriages between cousins we may prevent the ancestors from doubling in number at each degree in the scale; besides, the tendency to marry in one's own rank of society may, as far as the character depends upon rank, restrict the power of equalization. The law of regression to the average, says Galton,\* "tells very heavily against the *full* hereditary transmission of any gift. Only a few out of many children would be likely to differ from mediocrity as widely as their mid-parent" (i.e. "an ideal person of composite sex whose stature is half-way between the stature of the father and the transmuted stature† of the mother"), "and still fewer would differ as widely as the more exceptional of the two parents. The more bountifully the parent is gifted by nature, the more rare will be his good fortune if he begets a son who is as richly endowed as himself." In spite of this, "there is nothing in these statements to invalidate the general doctrine that the children of a gifted pair are much more likely to be gifted than the children of a mediocre pair," but they will be, *on the average*, less removed from mediocrity than their mid-parent. Besides, among all the children of a small number of gifted couples, consider the most capable, and compare with the most capable of the children of a *very large number of mediocre* parents; the former will generally be inferior to the latter. Galton adds that the law of regression to the average is "even-handed," because it "levies an equal succession tax on the transmission of badness as well as goodness." If this be so, why should the educator trouble about hereditary fatalities if, on the average, hereditary exceptions are neutralized and the average hereditary type persists? It is precisely this average that education professes to affect; the whole question is therefore one of knowing if the *qualities* of the average

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\* "Natural Inheritance," p. 106 (Tr.).

† Ibid. p. 87. For the meaning of *transmuted*, *vide* *ibid.* p. 6 (Tr.).

type, which unaided heredity does not transform, and leaves persistent, cannot be transformed by other influences, and notably by education itself.

Galton finds that in a cultured environment, out of every hundred women thirty-three are artistic, and twenty-eight are artistic out of every hundred men.\* Instead of being satisfied with this result as far as women are concerned, he considers the difference very small, when we consider the large share occupied by accomplishments in the education of women. And he concludes that the effect of education, compared with that of natural talent, is very small. This is a very arbitrary interpretation; the preceding statistics rather show the power of education, because the weaker sex, whose education has for centuries been inferior to that of man, is nevertheless able to show thirty-three per cent. of artistic women as compared with twenty-eight per cent. of artistic men. Besides, it is clear that natural talent is of the greatest moment in art; special aptitudes are necessary, partly due to the conformation of sensorial centres, and consequently to entirely organic causes over which education has little control. How can you make a singer out of one who cannot sing in tune, or a musician out of a man who has no ear and who cannot detect a false note, or a painter out of a man who has not a delicate sense of sight and a natural taste for form and colour?

Our problem is therefore the discovery of the qualities upon which education can exercise effectual influence. In the case of stature, this influence is, on the average, zero; stature is the result of determined physiological conditions which can only vary within very narrow limits. If a man were five yards high, he would cease to be a man; he would be a new species. To make use of the constancy of stature and the powerlessness of education to increase our height, in order to prove both the constancy of intellectual qualities and the powerlessness of education, is an unmistakable

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\* "Natural Inheritance," p. 154 (*Tr.*).

fallacy into which the fanatics of heredity are always falling. If the experience of ages teaches us that education is unable to modify stature or eye-colour (upon which Galton has brought some of his statistics to bear\*), it also teaches us that it can modify intelligence and morality. The intellectual power of a man is obviously increased by instruction. Instruction will not, no doubt, create genius, but it can give to the recipient a considerable sum total of knowledge and talent. Without the aid of instruction even the born genius would remain sterile. All the arguments, therefore, of the statisticians on the constancy of stature and of eye-colour prove absolutely nothing against the possible increase of the intellectual and moral capacities.

History demonstrates the view I advance. While stature and eye-colour in the same nation remain constant, the average intelligence and morality undergo the most obvious and often the most rapid changes. Take the Scotch of two hundred years ago—a sanguinary and vindictive race, with a heavier record of homicide than even Sicily and Corsica. Now, according to the statisticians, they are the mildest and most inoffensive people in Europe, and the list of murders and assassinations is less than anywhere else. Mr. Leslie Stephen has drawn attention to the rough and unfair national verdicts based upon the characteristics of “lay figures” of John Bull, etc. Their stature, their eyes, and the colour of their hair are nevertheless unchanged.† A similar change may be noticed in the Swiss, Piedmontese, Roumelians, Cossacks, and Bulgarians. The inhabitants of the Marquesas are transformed from cannibals into peaceful and hard-working men. The Servians have become kind and gentle, while their kinsmen and neighbours, the Montenegrins, are still violent and vindictive. M. Colajanni also calls attention to the fact that one tribe of the Redskins may be addicted to theft, while another of the same blood will be

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\* “Natural Inheritance,” p. 138 (*Tr*).

† *Vide* Colajanni, “*La Sociologia Criminale*,” vol. II.

honourable and straightforward. The Mongol is a coward in China, brave in Japan. The Jew is a business man, a banker, a money-lender in Europe; in Abyssinia he hates business, and takes to agriculture; while in the Caucasus he is a warrior! M. Tarde was perfectly right when he said that every race can be either "civilized or barbarized." Compare modern and ancient Greece, Calabria of the present day and Magna Græcia, and we descend from the highest civilization to the worst form of barbarism. In the history of Rome, M. Tarde sees open to every race, whatever its origin or colour, "a great and glorious competition," as it were, in which each in turn—Italy, Spain, Arabia, Gaul, Germany, Carthage, and Libya—won the prize of eloquence, poetry, and valour, and was seated upon the throne of the Cæsars. "By the grafting on a vast scale of Roman influence far beyond even the limits of the empire, it came about that savage humanity was nowhere unaffected." And did not the "Christianizing" of so many different races produce still more astonishing metamorphoses? Compare the German Christian with his savage predecessor, the Russian Christian with the old Russ. Where do we see, in all these instances, hereditary fatalities and the impotence of education?

Even within short periods, statistics exhibit the variations of morality and the more serious forms of crime. From year to year crime among minors is sensibly increasing; in a short time it has tripled. In England and in Spain, on the other hand, it is decreasing. The number of foundlings in the whole of France has risen from 26,000 in 1861 to 44,000 in 1885, and in Paris alone, from 2820 in 1877 to 3151 in 1883. The *Assistance Publique* at Paris places (as far as it can) most of these children with respectable peasants in the department of Nièvre. These children, "the offspring of vice and misery," should be infected from their birth with germs of the most fatal character, and M. Joly forcibly remarks that, if heredity played the predominant rôle attributed to it by the school of Lombroso, the conduct



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of these children would be deplorable. On the contrary, the peasants who have given them a home have rarely had to regret it, and in this department, "one of the freest from crime, these neo-peasants leave hardly any appreciable stain." The department of Hérault, which up to 1857 ranked among the two or three most moral departments in France, "being freest from crime," has become by degrees since 1868 more and more crime-stained, until it is now the 81st on the list. We may add, with M. Joly, that three quarters of the inhabitants of Hérault represent "individuals who have suddenly become enormously wealthy." What has heredity done against the temptations, suggestions, and examples of every kind which have sprung up in this department, and which have kindled the lust for pleasure with the lust for riches?

The short stature of the French with respect to the English has been attributed in a great measure to the devastating effect of the twenty-two years of war which followed the Revolution. Throughout that period, there was going on a continual selection of tall and strong men, and a rejection of all who were short and weak. The first mainly fell victims to death or disease, and those who returned home did not do so until they had spent the best years of their youth on the field of battle. The feeble remained at home to propagate the race. At first sight this would seem to have been a perturbing influence of great power. But according to even Galton's principles, this power is much exaggerated. On the one hand, the women were not affected by the process of selection, and therefore the perturbing influence was only one-half of what it would otherwise have been. Besides, the war only affected one generation; even if it had swept away all the men of high stature, the effect on the next generation would have been practically *nil*, for stature is determined by the total ancestry, and by fortuitous circumstances, such as are here and there the cause of a great man being born of mediocre parents. Nevertheless, if selection were to go on for generations,

it would in the long run be effectual. In artificial selection applied to animals, it proceeds by the persistent and unrelenting destruction of every individual not corresponding to the type, or by a suspension of natural functions continued from generation to generation. Nothing less than methodic and continuous action is necessary to maintain a series of generations above what may be called the point of normal equilibrium. But education is nothing but action of this kind, a method continuously applied throughout the ages to whole generations. Society requires for all its functions a certain number of average capacities, and thus produces constant selection. The educator enlightens and moralizes masses of individuals, not merely for a single generation, but for all time. In fact, education acts on the most flexible and most malleable part of our being, on the intellect, on the sentiment, and on the will. Although it cannot add five yards to our stature, it can add circumvolutions to the brain, or carve in it lines which without its aid would not have existed. It moulds the brains of a race. If, therefore, heredity always tends to restore the average equilibrium, education can raise the point of equilibrium, it can raise the centre of oscillation, and modify the normal average towards which heredity will produce regression. If heredity is the great force of conservation, ideas are the great force of progress; the former is statical and ensures equilibrium, the latter dynamical and ensure motion. It is owing to the former that water finds its own level, but the latter raise that level, just as the stream rises above low-water mark.

To secure in the physical domain the equivalent of what takes place in the intellectual and moral domain, we must assume that the stature of the tallest and most gifted could be gradually attained by means of imitation. This would happen if a genius were to invent some way of adding an inch to his stature; his proceedings would be eagerly imitated, and generations would very soon arise with stature slightly increased. Suppose another new invention for

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the same purpose, and a fresh imitation by all of moderate height; we should have in a short time, owing to the fixative power of heredity, a new increase of stature in the human race. An idea, in its origin, is a novelty; it is rapidly reproduced by imitation, and thus it goes to increase the common fund. Education fixes the acquired ideas, and develops the capacity for finding new ones.

We are asked if progress, which is the raising of the average level, depends especially upon the quality of ordinary men or upon the worth of exceptional men. The second factor is obviously the most primitive and the most important; first we must have an exceptional man to conceive a new idea, and *ipso facto* introduce a new force into the totality of social forces. But the rôle of mediocre men is to reproduce and imitate the idea, and thereby to fix it and to give it currency, and *ipso facto* to also make it one of the factors determining the average level of the species. The ultimate result is a raising of this level. Now, education acts simultaneously upon mediocre and superior men. It raises the mediocre to the level already attained by anterior generations; it also raises higher natures to that level, and in virtue of their native and exceptional qualities enables them to surpass it.

An attempt has been made to establish differences with respect to heredity between inferior, average, and superior men, by which the inferior and superior would be subjected to a stronger, and the average to a weaker heredity. These distinctions are artificial; heredity acts in precisely the same way with each individual; only in mediocre natures its effects are not so obvious, because they re-enter the common mould. Not less artificial is the distinction between men according to their educability. M. Ribot believes that the influence of education is most marked in average natures, and leaves but slight trace upon the inferior or superior natures. This may be admitted in the case of very inferior or abnormal natures; but as far as superior natures are concerned, Guyau fairly argues that the more

naturally intelligent we are, the more we are capable of learning and becoming clever by education; the more we are naturally generous, the more easily can we be educated into heroism. His conclusion is that genius is the simultaneous realization of the maximum of abundantly fruitful heredity and educability.\*

To sum up—there is a *via media* between the prejudices for and against education. If education does not manifest all the power of which it is capable, it is because it is rarely directed towards its true end, and by the means appropriate to that end. Hence ensues a loss of living forces by the neutralization and disorder of ideas. Ideas are sown in a somewhat haphazard fashion in the mind, and they also germinate exposed to the chance of external circumstances and inward predispositions; selection is here fortuitous, as in the domain of material forces. Instruction is not enough; instruction must itself become an education, a process of self-conscious and methodical selection between the ideas that tend to issue in action. The French are always crying for instruction; others cry for culture, and they are right. The first word brings us to consider the nature of the subjects taught; the second brings us to the degree of fertility acquired by the mind. Education should not be a simple acquisition of knowledge, but a cultivation of living forces, with a view to assuring the supremacy of the highest idea-forces.

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\* "Education and Heredity," p. 106.

## CHAPTER II.

*PHYSICAL EDUCATION FROM THE POINT OF VIEW OF  
EVOLUTION AND SELECTION.*

AFTER psychological selection within the individual, we must consider social selection, which takes place between different individuals, or races, or nations.

Every race has two essential means of superiority, the one physiological, the other psychological. It is of supreme importance that a race should be physiologically strong, and here alone the ordinary laws of natural selection are applicable, because we are in the domain of life. There is no idealist illusion to guard against; the *mens sana* can only exist in the *corpore sano*; all mental refinements in a race are not collectively equivalent to its *health, vigour*, and consequently its *fertility*. Even genius can only persist and progress in a vigorous race; in fact, selection can only come into operation and produce a natural *élite*—the necessary condition of all progress—in a fertile and numerous, *i.e.* in a vigorous race. Therefore, whenever the intellect is overworked at the expense of the body, the physiological level is lowered, and thereby the intellectual level; for, sooner or later, generations physiologically enfeebled will find their cerebral power impaired. This result has been fully and clearly stated by Spencer and by Guyau.\* The laws of

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\* Mr. James Sully, one of the principal psychologists in England, writes as follows in a critical notice of Guyau's "Education and Heredity," in *Mind*: "Never, perhaps, has the fundamental error underlying our present excessively narrow and intensified intellectual culture been more

heredity are inevitable ; the legacy of impoverished organs to children means a lowering of mental capacity in the more or less near future. In the struggle and selection of races throughout history, except when young and sometimes barbarous blood has been infused into the old stock of a nation, it fell lower and lower, become sterilized, and disappeared or declined, while other races were ascending.

Instruction, in my opinion, may have two results—either dynamical, *i.e.* an increase of cerebral power, or purely statical, as, for instance, in the results of scientific and literary routine. In the former case it acts on heredity, and may produce hereditary transmission of cerebral power ; in the latter it does not act at all, or only acts in the wrong direction, by exhausting the nervous system. It is intellectual power that is transmitted from one generation to another, and not the knowledge acquired. Hence the *criterion* I lay down to test methods of education and instruction : Is there an increase of mental, moral, and æsthetic power ? then the method is good ; Is the memory simply turned into a storehouse ? then the method is bad, for the brain is not a storehouse to be filled, but an organ to act.

The physical and intellectual dangers of over-pressure are not unreasonably in these days occupying our attention. In our system of instruction, over-pressure really does exist in the case of hard-working pupils who wish to pass an examination. In the case of the majority, however, there is no over-pressure ; they simply waste their time, “wearing out the school benches.” They take good care to retain nothing but vague and indistinct notions of everything that has been made to pass through their minds ; they are present, mere idle spectators, while their

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clearly demonstrated in the light of scientific principles than in this volume. To Guyau every individual is the temporary depository of a part of the force of the race ; and our modern system of education, instead of aiming at preserving this force in its most efficient forms, seems rather to be bent on consuming it,

masters make excursions through each special science ; what is over-pressure to others is only intellectual vagabondage to them. If all children were overworked, the race would very soon be lost ; as Guyau says, " The idle are, physically, the saviours of the race." Unfortunately, they contribute, on the other hand, to the maintenance of the race in intellectual and moral mediocrity, and they also give a wrong direction to public affairs. The advantages of their idleness, without its inconveniences, might have been secured if, instead of requiring from every one so much knowledge—most of which is useless—we had exacted only that amount of knowledge which is absolutely necessary, and a moderate *quantum* of ornamental knowledge, calculated to elevate the mind, and at the same time to interest it. If this were done, the numbers of the idle would be kept down, without falling into over-pressure and without eventually lowering the level of the race which we profess to elevate. We should not trouble ourselves about the number of things a child knows, but rather about *how* he knows them, *how* he has learned them ; and especially must we inquire into the general vigour communicated to him by his lessons, for this vigour alone will be a net profit to the race. How is the soil renewed ? By the sun, the air, the rain, by the free action of forces incessantly at work ; undisturbed on the surface, it is in a state of constant motion and germination beneath. So with the mind. At stated periods Nature must be allowed her own way, nor must we rudely interrupt the work of unconscious and spontaneous organization, which is being accomplished within the brain ; we leave the power to which we owe the grass and the trees to act without interference beneath the soil.

The Greeks knew and applied these laws. Did they not even separate gymnastics from music, *i.e.* from all the arts devoted to the muses ? Euripides wrote " Iphigenia " after winning the crown at the Olympic games. In the schools of Charlemagne violent games and archery were practically compulsory. M. Philippe Daryll has justly remarked that

the indolence of Italy was introduced into France with the Renaissance, first into court life, and then into literary society. The peasantry alone kept all its energy, of which it gave ample proof at the end of the eighteenth century. What the Medicis began—the impoverishment of the French race—Buonaparte finished with his “twenty consecutive years of bloodshed.” Add to this eighty years of imprisonment in school. The founders of the “Ligue pour l’Education physique” were therefore justified in urging the State to increase the number of open spaces for exercise, of public gardens, of fields for gymnastics, and especially for games. Games, in fact, are the best gymnastics,\* because they alone are at once complete and attractive; they exercise all the muscles and every part of the body; they exercise all the faculties of the intellect—rapid intuition, mental vivacity, imagination, and especially will and energy—all the fundamental qualities which make for superiority in the vital and intellectual competition of races. \*

The system of “muscles unexercised” and “brains under hard labour” is still more disastrous for women than for men. Woman is, *par excellence*, an instrument of natural selection, because of the qualities or defects she transmits to her children. Further, woman is the object of that second form of selection of which Darwin has exhibited the importance under the name of “sexual selection.” In the animal world, by pairing couples, sexual selection results in the choice and triumph of the qualities most advantageous to the race—typical beauty, vigour, health, and fertility. In the human race, sexual selection often deviates, but in spite of this, the law favourable to the species is as a rule maintained. Observation and statistics, in fact, show us that to excite love and to decide voluntary selection, the most powerful means a woman possesses are those which spring from external advantages; then come those supplied

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\* *Vide Journal of Education*, March, 1891; “The Place of Gymnastics in Physical Training” (*Tr.*).



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by the moral qualities; last and weakest are those due to intellectual attractions; and even the latter depend far less upon acquired knowledge than upon natural faculties such as quickness, wit, insight.\* Here a lesson in pedagogy is given by Nature herself, condemning the unnatural education at present in vogue. If indignation is expressed that man should be swayed by this hierarchy of qualities, an evolutionist like Spencer or Guyau will have no difficulty in showing that the apparent folly of lovers is really wisdom. Nature acts for the interests of the race; her supreme end is the welfare of posterity, her means—the selection of the couples best suited to that end. Now, as far as the race is concerned, “a cultivated intellect, based upon a bad physique, is of little worth, since its descendants will die out in one or two generations.” “Conversely, a good physique, however poor the accompanying mental endowments, is worth preserving, because, throughout future generations, the mental endowments may be indefinitely developed.”

Justly does Schopenhauer see in love a *ruse* of Nature, utilizing the individual for her own ends; the woman who is capable of bearing five children is more useful to humanity than a woman who has merely taken her B.Sc. And with health, morality is most important to the race; last in order of importance come intelligence and instruction—especially scientific instruction; love, blind as it seems, is really more farsighted than our pedagogic reformers.

To sum up: in both sexes, physical equilibrium is the foundation of mental equilibrium, especially if we consider the means and the race. We must therefore develop body and mind at the same time. The evolution of brain and of the faculties takes place under conditions which must not be transgressed; otherwise generation transmits to generation an unstable organism. This is an instance of what may be termed reversion.

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\* Spencer, “Education,” p. 187.

## CHAPTER III.

*THE OBJECTS OF INTELLECTUAL AND MORAL EDUCATION FROM THE NATIONAL STANDPOINT.*

WHAT are the essential objects of mental education, and what is their hierarchical order? Here, again, the doctrine of evolution and of natural selection may help us to answer this question.

From birth to manhood, the individual reproduces in himself the phases of this evolution of his species; now, which are the most stable and which are the most unstable of the characteristics acquired by the slow process of selection and eventually traditional in the species? The most stable characteristics are the oldest, and they are also the lowest, the most rudimentary, and the nearest the savage state; and they are also the most stable in the individual. To what, then, should education direct all its efforts? To whatever is at once the most elevated and the most unstable, and, *i.e.*, to the most disinterested and most general sentiments, to the most philosophical, the most moral, and the most æsthetic ideas. The rest will come of itself. Education must cultivate faculties which are the most elevated in character, and which have been most recently developed in the species by natural selection; it has no other aim than the giving to these faculties greater fixity and solidity. It must *civilize* the little savage which we call a child, and must at the same time prepare a new selection to the advantage of the best.

The really disinterested and human faculties, which

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should be selected from all the others, are—the love of truth for its own sake, the love of the beautiful, and the love of the universal good ; these, therefore, education must take as its principal object, in order to preserve and increase in the man what distinguishes him from the animal.

Further, in these three faculties is an hierarchy, in which precedence is due to their evolution as a whole and to their pre-eminence. Priority must belong to the moral sentiment which is the most essential of the three to the individual and to society. The moral sentiment is also the first to be developed in the child by home-education, in the forms of affection and obedience. The ancients did not separate the good from the beautiful, and rightly, for they appeal more to the heart and are more within the grasp of the young than is abstract truth. The beautiful is therefore the second object of education. Moreover, as Vico says, the child can only proceed to reason through the imagination. Finally, it is important to develop, if not in the child at any rate in the youth, the love of and delight in the search for scientific truth, which is the third object of education. I cannot agree with Renan, who urges that science is superior to morality for the human race, that the discovery of a fact or of a law surpasses in social fecundity the accomplishment of duty, and that genius is above virtue. The sentiments of justice and sympathy are the very bond which maintains the different members of the social organism in unity ; they are the life of the social organism. An ignorant community, practising public and private virtues, might live and even be happy. A community of *savants* without morality would be unlikely to persist and would be unhappy. Morality is no less necessary to the progress than to the preservation of society, which can only progress and prevail over its neighbours by courage, discipline, mutual cohesion, devotion to common interests, and by the spirit of abnegation and disinterestedness. Science is objective, and its objects are always present, hidden like treasure in the soil ; they cannot be lost, and may always

be discovered; if one lucky blow with the pick does not lead to its discovery, another may, and many men may in this case replace an individual. On the other hand, in morality, as in art, there is something purely personal, a rare and precious combination of subjective elements which cannot be met with twice; it is the *ineffabile individuum*. At the same time, a whole community of minds is condensed in a single mind, a world of sentiments is condensed in a single heart; and if this heart is not in existence to-day, it does not follow that it will be in existence to-morrow. Even in the development of the individual thought an idea is repeated; an emotion, an impression can never be recalled. Guyau, the philosopher-poet, did not always take the trouble of writing down the thoughts that struck him. "It will come back when I want it," he used to say; but if he felt an aesthetic impression, one of those indefinable emotions which are due to the moment, the environment, and one's inmost nature, he hastened to write it in prose or verse and to fix this fugitive something which is really a "mental state."

In fact, even science makes rapid progress only by the moral and aesthetic sentiments which excite to the search after truth for its own sake. And in education, science is of far less importance than the scientific spirit which, traced to its remotest source, is essentially disinterested, and produces an inevitable expansion of the ego. If the moral good, strictly so called, were ever taken from future humanity, there would still remain not only the beautiful, but also that other foretaste of the good, viz. the true. Would not a mind which has been elevated by a study of science for its own sake to general ideas and to the laws of the universe, retain a certain breadth, a certain habit of generalization, a capacity of abstracting the ego in the objective contemplation of things, i.e. a tendency to the impersonal and to the universal? That is the educative power of science. It accustoms us to breathe the pure mountain air, to the sight of the distant horizon; after descending to a lower level we feel confined and stifled. Can we conceive of a Newton,

a Pascal, a Laplace, a Darwin, as having a narrow mind? Without claiming that a man who is devoted to science is *ipso facto* virtuous, it must, however, be recognized that the love of the true (of what Trinitarians call the Word, the Son) paves the way for the love and for the kingdom of the Holy Spirit. "Man will always be lost in wonder and contemplation, even though the day may come when he no longer falls on his knees in prayer." \* This wonder at and contemplation of the universal laws of nature can no more be unaccompanied by a change of the moral attitude than a man can look at the stars without lifting up his head.

But if science takes us outside our ego, it is only by its most general and most speculative ideas, not by its particular details and practical applications. On looking at the question closer, we see that it is only the beautiful side of science that elevates and moralizes. Purely theoretical science, although apparently useless, is really that which is pre-eminently beautiful, or that which as yet appears to be beautiful, in spite of the profound utility it may be to the future. The brute scientific fact, so to speak, or the brute abstract law, has no educative virtue; the fact, taking a direction, must appear as the visible incarnation of the highest and most universal laws, and the law in its turn must appear as a world of truths enveloped and expressed in an infinite number of sensible facts; in a word, the sentiment of beauty springs from rich variety in unity. If at any time Science should be confined to practical applications, she will no longer discover either new truths or new utilities. In science the useful springs from the beautiful; beautiful theorems are found to be the most useful, but their discovery was due to their beauty and not to their utility. Every important truth was first a truth sought and admired for its beauty, and found by that instinct for the beautiful, which in scientific speculation is confounded with the instinct for the true. At first Kepler only saw in

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\* Guyau, "L'Irréligion de l'avenir."

the laws of the planetary orbits their sublimity ; similarly, Newton asserted the doctrine of universal gravitation because he saw in it a universal harmony, a reduction of variety to unity, an infinite fertility in simplicity itself.

“ Rien n'est beau que le vrai, dit un vers respecté,  
Et moi je lui réponds, sans crainte d'un blasphème :  
Rien n'est vrai que le beau, rien n'est vrai sans beauté.” \*

Further, Science needs for progress a certain idealism which transports her from the world of narrow realities to the vast field of the possible. Even to the geometer, the ordinary figures presented to us by reality are only particular cases of infinite possible combinations. Nowadays the quantities we call real are no longer considered as anything but particular cases of the quantities we call imaginary. What is called real is quite a secondary matter to a Descartes, or a Pascal, or a Leibnitz ; they see beyond all realities, and live in a kind of “ perpetual dream of the possible,” † and see in physical phenomena but echoes of higher harmonies. Faraday compares his intuitions of scientific truth to “ inward illuminations,” ecstasies, as it were, raising him above himself. One day, after long reflection on thought and matter, he suddenly saw in a poetic vision the whole world “ traversed by lines of force,” the infinite trembling of which produced light and heat throughout the immensities. And this instinctive vision was the origin of his theory. Let us pass in review the great initiators of modern science and the creators of industry, the Keplers and Fultons, and we shall be struck by the idealistic and sometimes even Utopian tendency peculiar to them. They are in their own way dreamers, artists, poets, controlled by experience. Now, how can we develop this idealism, this life of imagination, this enthusiasm for the possible soaring beyond realities ? By sound moral, æsthetic, and intellectual culture.

Huxley proposes to make the natural and physical sciences the basis of education. Spencer, in his turn, by a kind of

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\* Alfred de Musset, “ *Après une Lecture* ” (Tr.). † M. Laugel.

idolatry of science which is widespread in these days, makes of positive science almost exclusively the subject for youth, under the pretext that, in this life, geometry is necessary for the construction of bridges and railways, and that in every definite trade, even in poetry, we must have *knowledge*. How conclusive is poetry as an instance! Is a Virgil or a Racine made by learning rules of versification? The scientific man is not made by teaching him science, for true science, like poetry, is invention. We can learn to build a railway by rule of thumb, but those who invented railways did so only by the force of the intellectual power they had acquired, and not by the force of the mere knowledge they had received; it is therefore intellectual force that we must aim at developing. And then returns the question:—Is the best means of strengthening and developing the intellect of our youth, to load the memory with the results of modern science, or is it to teach them to reason, to imagine, to combine, to divine, to know beforehand what *ought* to be true from an innate sense of order and harmony, of the simple and the fruitful,—a sense near akin to that of the beautiful? And besides, are youths educated to be engineers or poets? Education is not an apprenticeship to a trade, it is the culture of moral and intellectual forces in the individual and in the race.

Science is only relatively a good thing, according to the use we make of it; even art has its dangers; morality alone is absolutely good. This makes instruction, especially scientific instruction, a two-edged weapon; its advantages are not without correlative disadvantages; it may effect a disproportion between the knowledge acquired and the environment in which the individual is placed, and it thus exposes the community to a kind of universal “unclassing,” from which spring discontent with one’s lot in life, restless ambition, jealousy, and revolt against social order. It is, therefore, necessary to choose the *objects* of instruction and to adapt them to the circumstances of each individual; we must not believe, as is too often believed in these days, that

all knowledge is always profitable. Again, nothing is certain and universally good but lofty sentiments and great ideas moral education is profitable to all and for all; instruction, especially scientific instruction, has no value except what education gives it. Acquired knowledge eventually produces good or bad effects according to the good or bad orientation of the ideas directing the conduct. In France the moral and social importance of a half-and-half grammatical and scientific instruction—left to chance, without any direction being given to it—has been considerably exaggerated. Instruction pure and simple is only a means, as yet indirect and uncertain, of moralizing and raising the nation, and this is because its end is twofold; it becomes of value for good only when the ideas that dominate it make for good. For mind and body alike, health is the only thing of constant and certain value, and morality is the health of the mind.

Further, entirely in opposition to the proposals of Huxley, Spencer, Bain, and many others, I do not give to positive science the first rank in the education of youth, because the sentiments are for us superior to the knowledge of facts or to abstract knowledge, and among the sentiments those in particular which have as their object the good and the beautiful. Too many *savants* forget that man does not live on bread or on algebra alone. Nowadays, positive science tends to suppress the traditionary morality of absolute duty and of sanction; it tends to suppress the religions by which egoistic sentiments are restrained; it tends, in fact, to suppress all social institutions which are not based upon the rights of majorities and on democratic principles. It would be idle to oppose the inevitable; but do we not see that to prevent a return to the strife between men left to vital laws alone, we must appeal to all the resources of morality and æsthetics, such as the sentiment of beauty and the culture of art? Here are two children with a flower; one, educated according to the "scientific method," tells us it is a gamopetalous, hypogynous dicotyledon; family, borragineous; name, *myosotis annua*; the other does not know all these



names, but he admires it, loves it, and carries it to his mother ; you give a good mark to the former and a kiss to the latter. A poet is far more important to humanity than a botanist. If we lose a botanist, we can get another ; if we lose a poet, he is never replaced. Happily, the true botanist is himself sensible of the beauty of the flower he studies ; he plucks it in the forest or on the mountain, in the presence of nature, beneath the radiant heavens ; he becomes a *poète malgré lui*, a poet without knowing it. Monocotyledons and dicotyledons disappear. But the fields, the glaciers, remain behind—and the flower itself, with its charm. What does the beauty of nature prove ? Nothing more than the beauty of a tragedy ; but there are few theorems of greater importance to humanity than the sentiment of beauty. The eye of the astronomer sees further than the heavens, and his disinterested admiration is more useful to humanity than even his discoveries.

## CHAPTER IV.

*THE SELECTION OF SUPERIORITIES. RATIONAL MEANS AVAILABLE.*

THE education of the mind, as we have seen, has as its aim the development of moral, æsthetic, and intellectual capacities; as this development is unequal in different individuals, education issues in the manifestation and selection of natural superiorities. These superiorities are not necessarily oppressive to others, unless they are at the disposal of an egoistic and tyrannical ambition; of themselves, they are indispensable to the different and unequally elevated functions which every nation requires. On the whole, in fact, the only means available for the elevation of a nation is the existence in its midst of individuals and groups, elevated above the rest by talent, merit, and morality. Besides, the intellectual and moral *élite* is, in a measure, the hereditary depositary of great national traditions; it connects the present with the past, and its duty is therefore to connect the past with the future. Hence the spirit of conservation and the spirit of progress equally call for the free selection of capacities, and their free access to the functions they are best fitted to perform. An imperfectly developed democracy may be instinctively and naturally hostile to everything that seems an *élite*; it believes that equality, which is necessary and just in the domain of rights, is in all cases the only law; it does not know (never having been taught) that the whole of nature progresses by the development of superiorities, by the onward march of the best—the best not only, as in the

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animal world, from the point of view of force, but also from the point of view of intellect, and especially from the point of view of morality. The first act of the collective life of an organism is to give the rest of the body a brain, which the rest of the body follows for its own conservation and progress. The individuals forming the national body, although equal in rights, are no more equal in function and in importance than the cellules that compose the human body. We must not, therefore, wish to reduce everything to a dead level under the pretence of equalizing. The paradox of pseudo-equality is equivalent to the statement :—“the human body is nothing but cellules, and all cellules are equal because in each we find nothing but carbon, hydrogen, oxygen, and nitrogen.” However, as M. Laffitte replies, let Shylock take his ounce of flesh off my arm or leg, and I remain myself ; but let him take it from the heart or from my brains, and my life is over.\* It is the duty of the dominant class and the government to look high and to look ahead, to prevent this blind levelling down, to react against the natural downward tendency of the masses. A real democracy, far from excluding natural superiorities, on the contrary, favours them.

In olden times the institution of a nobility was an attempt at a process of natural selection. M. Ribot has given excellent reasons why it might be illusory to count nowadays on either this form of selection, or, as Renan proposes, on imitating it for the advantage of *savants*, academies, etc. The nobility formed an *élite* only in a very restricted sense, that of the warlike virtues. If the absolute superiority of the nobility is already a moot point, the dogma of hereditary transmission is in an equally precarious condition. Heredity, acting under quite ideal conditions, would no doubt end in continuous repetition of the same types ; but, as a matter of fact, so many other laws come into competition with it, so many accidental circumstances come into play and thwart it,

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\* “Le Paradoxe de l'égalité,” p. 38.

that the resemblance of parent and child is only approximate. Is this resemblance in a given case sufficient or insufficient? Has the law of heredity been stronger than the exception, or *vice versa*? Experience alone can answer these questions; but "to submit the nobility to the test of experience," says M. Ribot, "to discuss its title at every birth, would mean its extinction." Besides, there is another law, with which the institution of a nobility clashes, viz. the "impoverishment of heredity." Every aristocracy, every close corporation, which has only been renewed from its own ranks, becomes gradually extinct. Water not renewed becomes foul; the ocean alone is large enough to contain within it enough waves, motion, and life to prevent it from becoming stagnant.

M. Ribot has determined the causes of this physical and mental impoverishment by showing that heredity is a force incessantly struggling against opposing forces, that it has its "struggle for existence," and that, each generation, even when victorious, issues from the struggle more weakened than before by its losses. It follows that, instead of a selection of superiorities, it, if isolated, produces in the long run a selection of inferiorities. Education alone is able, but imperfectly, to counterbalance these effects of heredity.

As an hereditary nobility is no longer possible in these days, and as, moreover, it has lost all its advantages, we must seek other processes of selection to constitute that natural aristocracy which we all agree is necessary, an aristocracy open and not closed, founded on talent and merit, and therefore what we may call a democratical aristocracy.

Nature, to carry out her selections, acts on the maximum number of individuals; this is a primary process it will be as well to imitate, but it can only be partially imitated, for nature is blind, and man is intelligent. It is impossible to give to all alike an instruction such as that dreamed of by the partisans of "integral instruction." There is an antinomy between the law of selections, of capacities, and the law of adaptation. If the field offered to selection be

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not wide enough, it ceases to operate ; if it were too wide, it would end in the development of capacities or pretensions which no longer find their use and ultimate adaptation. The unclassed will then apply to the State itself, and accuse it of not having furnished them with employment for the real or professed capacities education has developed in them. But the acquisition of knowledge is one thing, and the culture of the moral and intellectual faculties is another. The former, if beyond due bounds, and unadapted to the environment in which the child should live, must in the long run create a number of the unclassed ; but we can always, with advantage to all, supply in lavish profusion noble ideas and noble sentiments. The moral qualities—courage, justice, goodness, devotion—are equally necessary under any circumstances ; and more, they constitute, with physical vigour, the main strength of the species ; we must therefore develop them in each individual. The intellectual capacities—observation, reflection, judgment, method, etc.—are both useful to the individual and to the race. But it is by no means necessary for their development to apply them in the case of each individual to every object, nor to the maximum number of possible objects. The choice of objects must be regulated—but only in its sum total—by the present and future condition of the child.

The mistake into which we nowadays fall, and with our eyes open, is that of confounding the general education of the faculties with general and more or less encyclopædic instruction. It is by no means necessary, to be an intelligent man, to have learned organic chemistry, the history of Egypt, or the geography of Patagonia. I should therefore propose to lay down this rule : make moral and intellectual education as universal as possible, and restrict *objects of instruction* to the minimum absolutely necessary. In a word, the culture of the faculties is always good, for all subjects ; what may be mischievous is the choice of the *objects of knowledge*. Unfortunately, our educators turn their whole attention to the objects and to the matter of

instruction ; a kind of pedagogic materialism makes them neglect the mind to the advantage of everything external to it.

It is of importance in education to avoid all premature classification and specialization of minds, other than that which results from the *degree* of instruction chosen by the parents for their children. There must be a primary, a secondary, and a higher education, forming a natural hierarchy ; and each of these should maintain the maximum unity, generality, and elevation. For "the wind bloweth where it listeth ;" we can never tell beforehand where it will blow, unless we are on the mountain's crest where it has more liberty and space.

The second process of selection employed by nature is the subordination of the purely individual interest to the general interest of the species. But there again nature and man proceed in different ways. Nature, in her disdain for individualities, sacrifices them to the strongest ; in humanity it is impossible for the greatest number to be, according to Renan's aristocratic theory, "sacrificed" to a few privileged individuals ; on the contrary, only by not sacrificing any one do the superiorities emerge in the intellectual and moral world. This is a predominant distinction between human selection and animal or vegetable selection. The more the higher order of minds is surrounded by minds already elevated and capable of understanding them, the more is this environment favourable to their development. Education must therefore be harmful to none and useful to all. Many of the reforms advocated at the present moment in France would end in raising the level of intellectual and moral education for a few selected individuals, but would lower it as a whole for the rest. Such means as these are in contradiction to the end in view. If you narrowly restrict your field of operations and of the culture of the faculties, you thereby diminish the intellectual and moral fecundity of the race. The "scientific" *élite* dreamed of by Renan, which with science as its instrument would have the right and the power to govern the world, can itself be only the

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product of an artificial and narrow selection ; the *élite* should rise spontaneously and from our midst ; its rule must be accepted.

It is true that education should not directly propose to itself, with the utilitarians (after Bentham), "the greatest interest of the greatest number," the completest possible satisfaction of the greatest number of private interests. Suppose, for instance, that a system of culture (classical culture, for example) were recognized as the most capable of raising the intellectual and moral level of the nation, without perhaps being the method of treatment best adapted to educe from mediocrities the greatest possible positive and immediately useful return to each individual ; we should then have to choose between quality and quantity ; we should have to ask ourselves if it be of more importance to this nation to increase its moral and intellectual greatness, by means of a sufficient number of elevated minds, or to have within it only a large number of mediocrities keeping to the *statu quo* and busying themselves each with his own individual interests. Before a great ship is launched, she must have tall masts, and therefore there must be such things as high trees ; so we have to decide between that method of culture which produces the largest number of small plants all of the same size, and that which is calculated to raise pines to a towering height. But there is this difference, that in the moral and intellectual order, the high plants do not stifle the smaller, on the contrary, they help them by their shelter, by their sap, and by their strength. The educator must not consider the mere brute advantage that each individual will derive for himself, but the degree of elevation attained by all, and especially by the best, to the profit of all. To lower the level, under the pretence of equalizing those low down in the scale, is the safest way of making them descend lower still with those who might have been able to ascend. Let us, on the contrary, raise the moral and intellectual level ; let us ever raise it, not of course so as to make it inaccessible, but so as to gradually elevate the best, who in their turn will raise the others.

## CHAPTER V.

*UTILITARIAN EDUCATION AND TRUE NATIONAL INTERESTS.*

THE principles I have laid down condemn utilitarianism in education. As science only progresses by the spirit of disinterestedness, and as industry assumes scientific theory, industry itself only advances by aid of the disinterested love of the true, which is connected with the beauty of truth itself. Genius is only this love aided by exceptional faculties ; it only finds because it seeks, and it only seeks because it loves. Further, the universal craving for knowledge that may be applied prevents the selection of genius ; to look for useful truths before beautiful truths is to look for the fruit before the tree. And besides, how can we gauge beforehand the utility of a truth ? When he shouted "Eureka !" Archimedes did not know that he had also invented balloons. A Montgolfier, limited to the application of the principle discovered by another, is not as valuable to humanity as a Euclid or an Archimedes ; an Edison is not equivalent to a Leibnitz. It is not with the utilitarians that the pre-eminence will remain, for they will be barren as far as genius or even simple superiorities are concerned. A Descartes, a Leibnitz, or a Newton is neither born nor developed in a race exclusively devoted to the search for immediate utility ; such men can only breathe the atmosphere in which truth and beauty shine with a dazzling light, and where they are sought for their own sake.

To the French a utilitarian education would be peculiarly



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harmful, because it would be in contradiction to the temperament of the race. With all our faults of mobility, thoughtlessness, our over-hasty or superficial judgment, we have a quality of the first rank which has always saved us from the gravest consequences of our faults—enthusiasm. If France is to be faithful to her genius, she must remain “the land of enthusiasm,” and this sentiment, which can in time of need arouse a whole nation, is best excited by the beautiful.

Realistic and utilitarian education is the bane of political communities, and especially of democracies like France. We know that an imperfect democracy is the cult either of the individual or of the number considered as a mass of individuals. Hence every notion of a real and continuous fatherland, extending beyond the present collection of individuals and beyond the present majority, tends to disappear, to the advantage of individuals, whether dispersed or massed together. The will of the whole nation is therefore confused with the suffrage of the greatest number, *i.e.* with the interest of those who chance to have the upper hand at the time, and who should only consider themselves as the representatives of the whole, including the very minority whom they have defeated. The real national will is not exhausted when we speak of the sum total of individual wills at any moment. Millions of incoherent and scattered wills do not make a national will, and the present generations are only a fraction of the fatherland ; a *plébiscite* dictated by circumstances, by the passions or interests of the mass at a given moment, is not the national will, and still less is it the *ethical* will. It is a momentary cyclone, and not a constant and continuous current like the Gulf Stream. That policy which only considers the votes of the moment, without looking far ahead, is a tempestuous policy, and if education followed the same method, if it did not work for the whole race, for real “universality” which includes the future and the present, it would tend to compromise the existence of the nation, which would only be living from

hand to mouth. Public spirit would be weakened in the seeking after personal and immediate interests; numbers would stifle intellect, and the ultimate result would be universal debasement.

Again, suppose a country alone in the world or surrounded with a kind of wall of China! It still must struggle against its neighbours and obtain, not only equality with, but superiority over, them under pain of degeneration. Nations, as we know, are far from submitting to the beautiful laws of equality, of which a Rousseau or a Proudhon dreamed; now, to be superior to other nations, or even not to be simply inferior to them, a nation must perforce arouse within it every possible superiority. That is why education is not only a national but an international problem. The French felt this very keenly after their disasters in 1870—as did the Germans after Jena and in the days of Fichte. But the French have gone too far in attributing their defeats to a low level of knowledge and mere instruction; and consequently they have been carried away by utilitarian considerations. The French people, in their ignorance, cried, "We are defeated, we have been betrayed;" no less naïvely did educated men say in their turn, "We were defeated because we do not *know* geography, or history, or mathematics, or mechanics." And from highest to lowest they have overloaded the scientific side of the curriculum at the expense of classical literature. The result has been, as is now recognized, the lowering of the level of all subjects. Victories are due to much deeper causes than to the intellectual condition or to scientific knowledge; they are due to the directing ideas, to the sentiments and the will, to organization and discipline, to the *esprit de corps* animating the whole of the army and the nation. M. Hoenig, the author of a volume on "*L'Importance de la discipline pour l'État, le peuple, et l'armée*," tells us that the German recruits enrolled in his company had preserved but little recollection of what they learned on the benches at school. For some years he had to ascertain the amount of instruction of these

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recruits ; now the simplest facts of their own country were often unknown by these new additions to the regiment. "We set a number of questions on their own country, and the answers were incredible. After the war of 1870-71, many did not even know the name of the Emperor of Germany." Here, comments Grad,\* we are a long way off that wonderful knowledge of geography which was so widespread among the rank and file as to enable them to find their way along any road in a foreign country. According to Marshal Von Moltke, "education is far more important than scientific instruction, because knowledge alone does not give that self-sacrifice which is wanted for the service of the country. Authority above, obedience below, discipline is the whole soul of the army. An undisciplined army is an institution always costly, unreliable in war, full of danger in peace. It is this discipline that fitted our armies to win three campaigns." And by discipline the Germans mean all the military virtues, the qualities of the will and heart, and not merely those of the intellect. At the beginning of the century, on the eve of the catastrophe that nearly proved the ruin of Prussia, Schaarnhorst, the future reorganizer of the German army, wrote to his king, "We have begun to think more of the *science* of war than of military virtues ; but this has ever been the ruin of nations." And military virtues become more and more necessary as armies increase in size ; individual heroism loses its importance and general discipline becomes essential. Great armies, in fact, find cohesion, rapidity, and security necessary to their existence. In case of a normal mobilization, Germany would gather beneath her standards three million armed men, and with the reserves six millions ; the war footing of Russia is 2,900,000 ; of France, 1,900,000. If the present German army were set in motion on a single road, with all its reserves and trains complete, it would reach from one end of the empire to the other. With such masses of men,

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\* "Le Peuple Allemand."

moral and material discipline alone can maintain unity and promptitude of movement, as well as safety of supplies. Certainly the schoolmaster contributes to the final success, if he himself has taught and clearly formulated discipline, self-sacrifice, and devotion to duty—for these are at the same time ideas and sentiments. The principal conditions of victory for a modern army are, therefore, the development of solidarity, respect for the hierarchy, in a word, everything that *organizes* and unifies; geography and history, physics and chemistry, go for next to nothing, and that is why a Von Moltke places moral education far above purely intellectual and scientific instruction.

What is true of an army is true of a whole nation; every people divided, disorganized, and individualized to excess, becomes mere human dust; a whirlwind sweeps it away. The Emperor Frederick III., at the beginning of his reign, wrote to Bismarck: "I consider that the problem of the care to be given to the education of youth is intimately connected with social questions. A *higher* education should be made accessible to more and more extended *strata*, but we must avoid a *semi-instruction* which will create grave danger, and give rise to pretensions which the economic forces of the nation will be unable to satisfy. We must equally avoid neglecting our educative mission by exclusively attempting to increase instruction."

The pedagogic problem, in fact, is eventually confused, not only with questions of internal and external policy, but also with the social question. The Germans realize this more readily than any other people, because, with them, the danger is more pressing. The increase of nations and races is to modern communities an element of internal force and external expansion, but it also threatens them with far-reaching disturbance. In Germany the socialist vote has increased from 311,000 in 1881, to 800,000 in 1887, and to a million and a half in 1890. "When Germany," said one of the socialist leaders in the Reichstag, "has a population of sixty millions, the *government will pass into the hands*

*of the working classes by the mere effect of universal suffrage.* Now, while the population of France remains stationary and is comparatively decreasing, the Germans have a yearly increase of half a million ; *i.e.* the population of Germany by the end of the twentieth century will be 170 millions. By the end of the next century the government and the disposal of the military power of Germany may be in the hands of this ever-increasing socialism ; we see that invasion might threaten the French race from without at the very time she is threatened with disruption within. It has been rightly said that the policy "of blood and iron" now advocated between nations by Germany may some day be quite as legitimately invoked between classes.

To sum up—education has to take into account a twofold group of forces, those of conservation and those of progress. The former are at first maintained in the race by natural heredity, the latter by tradition of every possible kind, *i.e.* a sort of self-imitation by society throughout all time. The latter are chiefly developed by the initiative, invention, and search after novelty of minds constituting a governing *élite* and an aristocratical democracy. Education, by natural and not by artificial means, must assure the selection of capacities with a view to progress, with no less care than she must pay to securing the persistence of the conservative tradition which is the basis of society itself. It must therefore, in the true sense of the word, *elevate* every mind, it must only bestow attention upon what is moralizing, what is disinterested, and upon that which looks far ahead. It must renounce the superstition of knowledge which is only knowledge, of truth which is only truth, of fact which is only fact. A nation pre-eminently needs what is known as "public spirit," *i.e.* a spirit of devotion to the common weal ; it needs all the social and also all the intellectual virtues, which as we have seen consist in the disinterested love of the true and the beautiful. Utilitarian and positive education, or what goes by that name, is therefore more fatal than any other system to the fertility and force

of the nation. It is just now making some progress in Germany by the development of the Realschulen, which is causing no little anxiety to enlightened minds, and no doubt is preparing some checks for the Germans in the future ; let us maintain in our midst, so as to preserve and increase all our chances of success, a really liberal education, the only education that has ever been at the root of a nation's power. If individuals, if parents themselves, are always tempted to forget the general and national aim of education, the State ought to keep it constantly in view. France cannot, in the instruction of her children, consider the immediate and individual interest of the child, as the children themselves and the parents do ; she must work for the future of the nationality and of the race, for those future generations which represent an infinitely greater number of men than the present generation, and who are certainly the better part of our fatherland. The greater part of the knowledge that will be useful to the individual in his future profession, he will acquire by degrees as he wants it, but education has to make men and citizens incarnations of humanity itself. A liberal education can only deal with the necessary and the beautiful ; in most cases there is too much of "the useful" in it. Everything that is only useful is only relatively so, and therefore, relatively useless. The beautiful, the good, and speculative truth are alike universally and eternally useful.

## BOOK II.

SCIENTIFIC HUMANITIES FROM THE  
NATIONAL STANDPOINT.

## CHAPTER I.

*THE HUMANITIES AND THEIR GENERAL OBJECT.*

THE object of the humanities, as the name implies, is to awaken in the mind of the child ideas and sentiments which are really human, and which, if we may say so, connect the mind of youth with that of the whole of humanity. In other words, we must implant the best part of human evolution in the mind of the individual. For that purpose we must develop in the *subject* the faculties which make the man, and we must give for *objects* to those faculties the highest truths and the loftiest sentiments to which the mind of man has attained. Higher education, assuming minds already formed, treats these objects from every side, and even seeks to discover new objects. *Knowledge* is its principal end. Primary education, while aiming at the development of the faculties of the child, is reduced to occupying itself chiefly with these objects, the knowledge of which is essential to all ; its object is the minimum of indispensable knowledge, just as the object of higher education is the maximum of possible knowledge. With secondary education it is quite different, and this is forgotten

by almost all who have not studied the problem philosophically. No doubt secondary education has objects which it brings into relation with the mind, for, as M. Rabier says, "the mind is never exercised on nothing," but it is none the less true that the proper aim of secondary education is the formation, development, and evolution of the mind. We must therefore take not things, but man himself—or more generally speaking, humanity—as our object, and that is why studies of this kind deserve *par excellence* the name of humanities. It also follows that the first rank in the humanities must be given, not to material, but to moral and social subjects. As M. Lachelier neatly puts it, "the real object of these studies is the nature and the moral life of man." Hence their character of lofty disinterestedness, which has won for them the name of liberal studies. Primary education cannot be severed from a certain utilitarianism, because its object is the *necessary*, what is essentially useful; secondary education has mainly in view the *good* and the *beautiful*; higher education is chiefly occupied with the *true*, either with what is already known, or with the discovery of new truths. These objects of instruction in secondary education are therefore not a matter of complete indifference; we must choose by preference those the knowledge of which is best adapted to secure the evolution of the individual and of the nation to which he belongs. Instruction is here a means, education an end. In fact, literature being the freest and broadest expression of the human mind, it has been hitherto taken as the foundation of the humanities, just as philosophy is their crown.

Such are the principles that have inspired education in France from the days of Montaigne, Bossuet, and Fénelon, to Rollin and the great names of the French University. Other nations have but followed in our wake. Germany absorbed and still retains the spirit of our great schools and universities. In Germany the distinction between students in letters and science is unknown. Those who intend to be



doctors and engineers receive the same classical culture as those who are to be teachers or lawyers. The same *Abiturientenexamen*, corresponding to the English matriculation or the French B. ès. L., admits them to the universities, and comprises: (1) a German essay; (2) a Latin essay; (3) Latin prose; (4) Greek prose; (5) French prose (no dictionaries allowed); \* (6) mathematics. The latter is all the science required! In the *viva voce* they are examined in Latin and Greek authors, in Greek and Roman, or German history. Geography is associated with history, *but is not made the object of special study*. Here we see to what is reduced the important part attributed by legend to geography among the Germans. Finally, they are questioned on arithmetic, geometry, and elementary algebra. No questions are asked in physics or natural history. In other words, all that is required is a sound knowledge of Latin, Greek, and mathematics. If students want to study science, they may do so to their hearts' content at the universities. There they will remain for four years, being on the average about nineteen when they take their *abiturientenexamen*, *i.e.* they will study until they are about twenty-three. This system shows that we can have scientific men without overloading them with science at school; and that a good classic may afterwards build solid bridges or superintend the working of mines.

In the gymnasiums there are not even special teachers for science.† At the State examination each candidate who proposes to adopt teaching as his profession has to offer himself for examination in at least two branches; for example, classics and natural history, history and modern languages, mathematics and geography, etc. Their minds are, therefore, less wrapped up in their special work, and, therefore, less narrow. Besides, fewer teachers are necessary. The German gymnasium has nine ordinary masters and four or five assistants, forming a simple and compact staff, such as

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\* A Latin-German Dictionary is now allowed (*Tr.*).

† This is gradually ceasing to be the case (*Tr.*).

the French had about 1840, before the deplorable line of demarcation was drawn between science and letters. Since then, in addition to students in letters and science, the French have naval students, students at St. Cyr and the Polytechnique, technical students—all fascinated by the practical end at which they aim, and profoundly indifferent to everything but just what is required from them. This parcelling out of studies into specialities, besides involving an inevitable lowering of general studies, is extremely mischievous in its influence on the special subjects which it is fondly imagined are thereby fostered.

While remaining faithful to the traditions of classical education, Germany has wished to avoid the excesses into which, in some of our schools, the culture of the faculties for their own sake had fallen ; I mean that purely *formal* culture held in honour by the Jesuits, which exercised but did not nourish the mind, as if the mind as well as the body did not need the nourishment that stores up the living power and the exercises by which that power is made available. But Germany, avoiding one pitfall, has fallen into another. In education she has given the first rank in moral and social science to historical and philological science ; *i.e.* she has fallen into erudition. Now, to learn facts, dates, and words is an arresting of what may be called the material of human evolution, instead of a penetrating into the real spirit of the humanities. Disconnected from moral, social, and philosophical considerations, history, geography, and linguistics are still material sciences, just as physics or geology. And they have an additional inferiority in being not only much less scientific, but much less useful.

In England, the school of evolution, originating in the school of utilitarians, and finding, moreover, in the nation itself, traditions of utilitarianism, has allowed itself to be led astray by the mirage of the natural sciences, and has aimed at making those sciences the bases of instruction. In the science of education it had thus opposed naturalism to what may be called "humanism." Spencer opens his volume

on education by the statement that in all things the end in view is *knowledge*, a principle the falsity of which we have seen. Thus, throughout the book, Spencer is wavering between the ideal of primary and the ideal of higher education, without even a suspicion of what secondary instruction is. This idolizing of science is all the more surprising because, in his "Sociology," Spencer insists on the powerlessness of instruction to modify individuals and nations, on the inefficacy of elementary knowledge, on the omnipotence of heredity, and on the superiority of sentiments to abstract ideas. Spencer's pedagogy is thus at variance with his own views, and is eagerly pursuing an end of which it has exhibited the inadequacy. Further, he confuses the inward evolution of man with those outward objects the knowledge of which may modify but cannot cause it; man is absorbed in nature, and the "humanities" are eliminated from such a system.

## CHAPTER II.

*FAULTS IN OUR TEACHING OF SCIENCE.*

"THE natural sciences," it has been said, "are chiefly valuable from the humanities they contain." The properly organized study of science has recently and justly been called "the scientific humanities." I propose to show what is meant by this organization. In my opinion the aim of the real scientific humanities should be the transformation of the material sciences into moral science, by teaching their spirit, methods, principles, and conclusions, and, finally, their history and social consequences. We shall afterwards take up the question of the classic humanities, which, in my opinion, should be reformed in the same direction.

Spencer can no longer in these days compare science to Cinderella, and literature to her haughty and frivolous sisters; it seems clear that science nowadays is proud, and not literature. The French University has allowed itself to be invaded by the different sciences, and has given to each of them an important part in the *programme* of 1885. It is now unanimously recognized that this scientific instruction, far from raising the level of studies, has only lowered it. In spite of that, positive science is still so tyrannical in its influence on our educational system—thanks to its being a *sine quâ non* in the competition for admission into the State schools—that it is important to ascertain its real value in education.

Science gives us a model of what truth is; it accustoms us to weigh evidence; it gives us method—which has been

called the virtue of the intellect. But, if it presents advantages, it also, when isolated, presents grave disadvantages which are forgotten by those who wish to make it the foundation of education.

To justify the increasing importance attached to it, elementary instruction in science must avoid three pitfalls—it must neither be too material, too utilitarian, nor too special. You say you accustom the child to observe. To observe what? Material objects, that it turns round and round, takes to pieces, or breaks, if necessary, to discover their properties and structure; it may be a stalk of hemp or flax, it may be corn or a flower, a piece of chalk or quartz, the pen he is using, a brush—any of the usual objects around him. Thus the child is accustomed to believe nothing *but what he sees*. This development of the positive spirit is useful in the domain of natural science, but it is not without danger in other fields, and needs a corrective. You also tell the child that each word should by its scientific definition express a thing absolutely accurate, representable, and, in ultimate analysis, sensible; an excellent habit in geometry and physics, in which we have to do with material things; but material precision does not also give us clearness of moral vision; when you speak to him of *honour*, *duty*, or his native country, what can they materially represent to his imagination? What objects observable by the senses will be attached to these sublime names? Realities in the moral order; but these realities are ignored by scientific instruction.

The present study of science, with its infinity of detail and application, and unaccompanied by general and philosophical views, has a second fault—its too utilitarian tendency. No lofty aim is presented to the child's mind; he can only say, "I learn arithmetic because some day it will be useful to me to know how to count; I learn physics because it will be useful to me to know the properties of bodies; I learn mechanics because the subject is useful in making machines; I learn natural history because it is

useful in hygiene and in medicine ; I learn geography because it is useful to know about different countries, and because it is said to be useful in time of war, etc. The child thus runs the risk of taking self-interest as the universal standard, and the more our curricula are overloaded with unconnected special sciences, the less educated virtue they have.

Let us go a step further. Supposing that the study of science—*i.e.* of science as at present conceived—gives depth to the mind, they continue in reality to restrict instruction to *formal* science. What are mathematics ? Purely formal science. Arithmetic and algebra are the rhetoric of numbers. Given any abstract data you like, upon those data we then reason and reason, and from those data we draw deduction after deduction. General principles are applied to particular problems, and the solution of these problems becomes a petty mechanical talent, like the syllogistic talent of the Middle Ages, or like Raymond-Lulle's reasoning-machine. The very science of motion, mechanics, the queen of the ages, is still based upon formal relations in space and time ; it is always making its deductions and reasoning as far as it can on an hypothesis which is the equivalent in science of the subject of a Latin speech in literature. It is true that in the one case we must reason accurately, and that in the other it is not necessary to do so ; but even then, when the cause we have to sustain is a bad one, it is good to talk nonsense. But the mathematician will never in real life reason better than others, because he is accustomed to abstract reasoning, to deducing the rectilinear consequences of an hypothesis, and is not accustomed to observing and connecting all the data of experience, nor to the induction, the guessing, and the appraising of probabilities. In private and public life, the mathematical spirit is the art of seeing only one side of the question. In mathematical science we make our own depositions ; in the world of reality experience furnishes us with definitions, and is ever transforming and correcting them by fresh determinations. We always find

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in results more than we had found in our definitions and principles. We had said, "Two and two make four ;" but we find five, and our narrow formulas are invaded by nature and life.

Mathematics develop that kind of reasoning by signs, so happily termed by Leibnitz symbolic reasoning ; they replace objects by more or less conventional substitutes. It follows that they may give the habit of thinking by formulas, without taking into account the things themselves, the habit of retailing the results of reasoning without having gone through the process of reasoning. Leibnitz called this "peittacism." Algebraists look down on grammarians ; but they should not forget that if the latter have mainly to do with words, they themselves are taken up with signs, which are still further removed from intuitive reality. The mind is only exercised on *quantities*, not on *qualities*, and we may be able to solve problems in the differential calculus without being thereby any the wiser in our moral and social life. We do not learn to draw the delicate lines of the human face by drawing straight lines, triangles, or squares ; what is wanted is the power of taking things in at a glance, and the artistic instinct. Similarly, the solution of scientific problems is not of the same order as that of a moral or literary problem.

But the physical sciences ? some one will say. They lift us into the world of form ; they give to the youthful mind the depth it lacks ; they accustom the young to observe, to experiment, and to draw inferences. This is an optical illusion, as more than one philosopher has pointed out, from Herbart to Guyau. It is supposed that the teaching of science *ex professo*, as in classes at school, develops the same mental qualities that were necessary to great scientists in the construction and advancement of science ; but instruction even in natural and physical science chiefly develops the memory, and not the inductive reasoning, and the spirit of speculation and hypothesis, which are the indispensable requisites for any discovery. Think how

Pascal groped in the dark, recall the series of experiments and assumptions he had to make before he could prove that air had weight,—a series which began with Galileo and Torricelli. Is the natural science master of to-day making inductions, or observations, or hypotheses? Nothing of the kind; he does not make his pupils go through the inductive chain anew. He begins at the other end; he lays down dogmatically the theory of the weight of the air, deduces the principal consequences, and finally gives the boys new deductions to draw, in the form of problems. There is no mental process going on in the boys analogous to that which was going on in Torricelli, Galileo, or Pascal. They are told—It has been proved that air has weight; it has been proved that the earth revolves. Still, extraordinarily enough, they do teach them a little history apropos of these two important discoveries. That alone is worth all the theory taught, because it is a good example of the intellectual virtues without which discoveries cannot be made. The teaching of science *ex cathedra* and science itself are so different as to be almost antithetic, just as the active is the opposite of the passive, and invention the opposite of memory.

Now let us see at work this intellectual gymnastics to which young people, according to Spencer, Bain, Huxley, and their disciples in France, are subjected by the teaching of positive science. The chemistry-master enters the classroom; the subject of his lesson is chemical affinity. The boys take their pens and wait. "To explain the union of different simple bodies in the same composite molecule, we must admit the existence of a force which first of all attracts them one to the other, and then maintains the union thus effected. This force is called *affinity*."\* The boy, knowing nothing about this *force* which maintains the union of bodies, writes as rapidly as possible a simple "definition of words," which he is told to learn by heart. "We are going

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\* A lesson taken down in shorthand at one of the great lycées.



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to examine the characteristics of affinity, and the principal causes that modify it." Boy writes: "*Characters, modifying causes.*" Meanwhile, the master proceeds: "(1) Before affinity can be exercised between two bodies there must be contact. A very simple experiment will be enough to show us this." During the experiment the pen has a moment's rest. "This is an aqueous solution of baryta, and this is a rod dipped in  $H_2SO_4$ . Sulphuric acid and baryta have a strong tendency to combine and form a body known as baric sulphate." This is a new name to be engraved on the *memory*. "Now I bring the baryta as close as possible to the surface of the liquid, and you see that combination does not take place. Now I touch the solution of baryta. You see baric sulphate is produced immediately contact takes place. It takes the form of a white insoluble powder." The boys look on, and the only scientific effort, the only induction, the only experiment they have to make is the ascertaining the presence of a white powder at the end of the rod. Certainly, the experiment is an interesting and even an amusing one, but has it in the least initiated those boys into the method by which the beautiful laws of affinity were discovered, the philosophical inter-relation of forces, or their marvellous transformation one into the other? Every chemical or physical experiment, however ingenious it may be, is laid down in every detail beforehand. It develops before absolutely passive spectators just as if it were merely a description. They will never be experimenters because they have seen a series of experiments. They will have seen a vacuum created in a pneumatic machine, they will have seen a heated ball unable to pass through the ring through which it easily slipped when cold, etc. That is all very good in its way, but teaching by watching experiments is not teaching by *action*, and our boys do not act at these lessons, they watch, make notes, and summarize. All it comes to is stringing together fugitive phrases caught at random. The mind is very little developed by this, even from the *scientific* point of view.

But the course of Natural History! There, at any rate, the boys learn to observe, get a knowledge of things, and (as it is more extended), according to M. Blanchard, a knowledge of "men." Here is another shorthand report: "After what I said in our last lesson of the rôle played by liquid nourishment in the animal economy and of the influence of respiration on the physiological properties of these liquids, it is evident that they should be in perpetual motion, in order that every part of the body may receive the material necessary to its nutrition. This movement constitutes what physiologists call the *circulation of the blood*." Here we find the inductive and experimental method in the act of being transformed into the deductive and dogmatic method in science-teaching. Instead of telling the boys by what prodigies of patience and intelligence the circulation of the blood was discovered, they are told—"it is *evident* that the blood must circulate, and, as a matter of fact, it does circulate." As a rule, the master limits himself to adding—This phenomenon was unknown to the ancients; its discovery is due to Harvey, physician to Charles I., King of England (1618)." Thus summed up, this fact—far more important than any battle that ever was fought—remains a feeble detail, and simply a little more added to the burden of the memory. "In the higher animals, the circulation takes place in the interior of a very complicated piece of apparatus, composed of—(1) A system of canals and membranous tubes," etc. Then follows a minute description, assisted by anatomical drawings, and with none of the experiments which form the foundation of physics. The pupils look on and try to fix in their memories the names of the different arteries, of the veins, and their definitions. Here, again, the boys will have exercised no intellectual faculty but that of memory, which, while their hands were mechanically travelling over the paper, was no less mechanically inscribing, in the frontal convolutions of their brains, certain number of facts and words. After that, certain scientific men will ridicule the lad who writes Latin prose

and Latin verse. There is no paradox, however, in maintaining that the study of grammar and literature is more adapted than the study of science to the development of a scientific spirit, *i.e.* the spirit of induction, research, divination, hypothesis, observation, experiment, ingenuity, and patience (the patience of a Newton). Yes, to analyze a phrase and thoroughly grasp its meaning, to translate one's own thoughts into expressions accurately conveying their meaning—especially in an ancient language—induction, observation, experiment and test, divination, hypothesis, and speculation of every kind are necessary. This exercise will make you more like the inventors of the barometer or thermometer than if you are simply present in a class in which a thermometer is being made. All the notes a science student ever made go for next to nothing in communicating the spirit of scientific and speculative invention, compared with a translation, with a piece of prose, or even with Latin verses. The spirit of insight is more necessary to the doctor, the naturalist, and the geometer than the spirit of geometry. Gladstone was reading Homer and writing Latin verses during his whole life at Eton; he was barely taught the elements of arithmetic. Reverse the circumstances, imagine him a profound arithmetician, but with no literary training. It is very doubtful if he ever would have become an incomparable financial minister. Claude Bernard began by writing plays and by ideal experiments on character before his experiments upon organisms.

There is much exaggeration also in the habit of observation that is supposed to be developed by the study of external objects. In France the elements of geology are taught to boys under twelve—"Silicious stones, rock crystal, flint, quarry-stone, sandstone, granite, the complex structure of granite, gravel, clay, limestone," etc. In the fifth (still under twelve)—"stratified and unstratified rocks, trilobites, fossil molluscs and fish, the Silurian formation, slate, Devonian formation, Pyrenean marbles, secondary formation, ammonites, belemnites, Triassic formation, rock-

salt and gypsum, Jurassic formation, calcareous Oolites," etc. The best part of this programme is the excursions in the open air for which it serves as a pretext. But they do not lead to any better "observation of man," or appraising or controlling of character, because the nature of a formation has been ascertained, or a piece of quartz recognized, or a host of learned names committed to memory, or the number of petals of a flower counted, or even because botanical rambles have been made. The learning of external observation does not imply the learning of internal observation. A great naturalist may be the simplest of men and the simplest of psychologists. In fact it is almost always so. The observation of animals is closely akin to the observation of human beings, but how can children be expected to become observers of animals, quite apart from the fact that animal is far more difficult than human psychology? The study of natural history, which is the most passive of all from the purely descriptive and narrative character it assumes in our teaching, is knowledge rather than science; it is either a mere exercise of the memory, or amusement and relaxation, or a study of practical utility; on its poetic and philosophical side alone, with which our method of teaching does not, however, concern itself, has it any educative value.

The third defect which science-teaching should avoid is what is called "specialization," which restricts each special science to its own domain, without linking it with others, and without eliciting the synthetic connection of the whole. As it exists at present, our teaching of various sciences, not only many in number but each isolated from the rest, is a second tower of Babel, added to that erected by the teachers of ancient and modern languages and of ancient and modern history; each gives a course of lessons in an idiom of his own, and the result is eventually nothing but a series of specialities which is unfolded before the student. The fragmentary and disconnected knowledge which is thus given to our youth no longer possesses either scientific consistency or educative virtue. As our intellectual faculties

aim at unity of principles, so our moral faculties aim at the unity of different ends in the good. If instruction is not reduced to a unity from which springs a conception of the great laws of the world and of human society, it *ipso facto* neglects the ideal ends of life, and ceases to make science useful for conduct. With their supreme truth and beauty, the different sciences also lose their morality. They run the risk of favouring the same vicious tendency which is at present evident in literature and in art. Who is not struck in these days with what is called the "subjectivism" of men of letters, poets, artists, critics, each concerned mainly with his own ego, his own impressions, his own more or less narrow personality? This is the invasion of literature, poetry, and art by egoism. Do we want this intellectual egoism to penetrate further into science itself?

The lowering of the mental level consequent on extreme division of labour extends to those who are destined to enlighten and instruct others. As John Stuart Mill says: "A man's mind is as fatally narrowed, and his feelings towards the great ends of humanity as miserably stunted, by giving all his thoughts to the classification of a few insects, or the resolution of a few equations, as to sharpening the points or putting on the heads of pins." \* "Specializing" is adapted to the disaggregation of all it affects; it is the failing of too many *savants*, who, contrary to their true interests, betray a decided aversion to broad and philosophic views. The minute details with which they are perpetually occupied, the infinitely small wheels they turn in the great social mechanism, prevent them from grasping the sentiment of total unity, and the sentiment of their unity with their fellow-men; but this sentiment constitutes "public spirit." Hence their work becomes "simply a tribute to material necessity," instead of being the "happy accomplishment of a social function."

Our system of education is no more in accord with the

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\* J. S. Mill, "Auguste Comte and Positivism," p. 95 (Tr.).

positive than with the idealistic conception. Auguste Comte tells us that, "the first and essential condition of intellectual and moral education should consist in its rigorous *universality*." He expressly claims "an instruction capable of varied extension in a constantly identical and equal system." Now, according to Comte, the universal part of science is its spirit, its method, and its great results; these, then, are the positive bases of scientific education. He also sees in specializing a most formidable and a very rapidly increasing evil which will retard our moral and intellectual regeneration. "All the forces of society should be brought into play to combat this direction of the mind." And there is only one remedy—a broad, general, and really unified education which may serve as the common foundation of ulterior specializing. The evil exists even in Germany; the illustrious Rector of the Academy at Berlin, M. Dubois-Reymond, protests against the *industrialism* which is presented as the aim of scientific instruction. "Science, minus the philosophical spirit, narrows the mental field, and destroys the sense of the ideal." If science, on the one hand, issues in the progress of industry, it should tend, on the other hand, to the progress of the moral world. Moreover, what is positive science outside morality but a superior form of force, more dangerous perhaps than brute force, because it is more powerful, although it is, as has been said, scarcely more worthy of respect?

A wider extension of scientific instruction into primary education has by no means raised the moral level; the moral level has, on the contrary, been lowered. I do not say that the fault is due to the study of science, but it is certain that when science is separated from moral education, it develops in the child a certain vain presumption which ultimately tends to relegate him to the ranks of the unclassed. Besides, the tool with which it furnishes him is two-edged. We know that the criminal records of the early part of the century gave sixty-one per cent. of persons who had received no instruction. In the face of such a proportion, it was

supposed that ignorance was the main cause of criminality, and the authorities set to work to extend primary instruction. "Now that it is obligatory," says Guyau, "the proportion is simply reversed; out of a hundred prisoners, seventy have received grammatical and scientific instruction, and thirty have not."\* We also know that the number of crimes and offences committed by minors is increasing. It follows that the subjects of every kind with which our curricula are over-crowded are no substitute for a sound moral education. In secondary instruction, if science ultimately absorbs everything at the expense of literature and philosophy, I am persuaded that in some form or other a general demoralization must ensue.

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\* Guyau, "Education and Heredity," pp. 178, 179 (*Tr.*).

## CHAPTER III.

THE PHILOSOPHICAL REFORM OF SCIENTIFIC STUDIES.  
THEIR TRANSFORMATION INTO HUMANITIES.

REFORM of scientific studies must keep a twofold end in view : simplification, unification ; and these are only possible by a philosophical organization of education.

I. With what part of the tree of science must we familiarize the child ? The roots, the trunk, and the great branches ; do not make them count all the leaves. In the case of the young we must reduce everything to just what is essential ; the more the detailed study of science is reduced, the more will the really scientific spirit be developed—that spirit which is the antithesis to diversity of application and to mechanical memory. If a Descartes were in these days to write another “ Discourse on Method,” how clearly he would demonstrate the profound inutility of most of the so-called scientific studies !—their practical and pedagogic inutility, to say the least of it. What a magisterial rending of programmes would there be, of programmes which seem to have no object but to deaden and, as would have been said in the time of Descartes, to *astonish* the mind !

What is the type of a bad scientific book ? The manual. Well, our so-called scientific—and let me add historical and geographical—instruction, tends nowadays to make the student into a living but mutilated and inaccurate textbook, full of blunders and confusion. That is too often the meaning of the diploma given after an examination. Teachers of science, as well as of history and geography,



forget that excessive development of the memory is fatal to the other functions of the intellect. The cerebral powers, at each period of life, are limited, and we can only exact from them a certain total effort. Robert Brown knew nearly twenty-five thousand names of vegetable species; Kant, twenty thousand. When they wanted to learn new names, they forgot those they already knew. When a child's memory is overweighted in one direction it discharges its contents in another.

"To *learn* science" is an empty phrase, for, as a matter of fact, science is not learned, it is created; and Aristotle rightly asserted that in this connection knowledge is creation. *Results* alone may be the object of knowledge! but results are only a table of contents, they are neither the book itself nor the spirit that dictated it. When we wish to make young people learn too many subjects, and even these too rapidly, we are overtasking their will and intellect, and we are giving them no leisure for reflection to grasp what they have done, or to prepare for fresh conquests. We are, therefore, fashioning brains adapted to the application of cut-and-dried formulas; but we also are weakening the power of invention and decision. In a word, knowledge that is too extended and, *ipso facto* too superficial, will stifle the intellect and relax the character. Hence springs the "dearth of men" prophesied by Alexander de Humboldt half a century ago. We treat the brain as a passive piece of parchment on which is to be written in close lines the maximum quantity of geometry, physics, and natural history, etc. And this passivity tends to extend from the intellect to the character, from the individual to the race. The *savants* themselves are forced to confess with M. C. Vogt, that, by the present style of science-teaching, "individual initiative is more and more lessened, and tends to become replaced by work of an ever more and more mechanical character." We are content with grinding equations in a mill which works almost automatically ever since its invention by Leibnitz and Descartes.

If a cataclysm in its destructive course were to destroy our civilization, and if, years after, one of the programmes of the baccalauréat were discovered under the ruins, we should be stupefied by the encyclopædic science of our matriculants—

*Grandiaque effossis mirabitur ossa sepulchris.*

We, their contemporaries, know the real value of these giants of science. The real intellectual dynamometer is the conception and realization of ideas which have become living forces. One of the maxims of German pedagogy—and it was also a maxim in the pedagogy of the ancients—is that our knowledge is not ours until it is converted into a faculty and into an instinct.

Will any one assert that this heavy technical apparatus is necessary to artisans, engineers, doctors, officers in the army, etc.? If we look at things a little closer, we may be able to convince him that this is an illusion. Every career requires the knowledge of a good many special subjects, and of a few general subjects. The special knowledge is acquired by immediate preparation for the profession, and chiefly by practice in that profession, which puts our opponents, in the popular phrase, “in a fix.” As for general scientific knowledge, it need not be so extensive; to know what is absolutely necessary, and to know it thoroughly, is all that is wanted. The founders of the École Polytechnique, says Biot, “men accustomed to general ideas, whose minds had been elevated and whose views had been widened by the Revolution, . . . knew that the science of a good engineer is composed of general notions, common to all the professions, of practical details which are proper to each. Among the former and in the first rank are higher mathematics, which give mental grasp and sagacity. Then come the principal theories in Chemistry and Physics.”\* If it is good for my intellectual education to learn the formulas  $\text{NO}$ ,  $\text{NO}_2$ ,  $\text{NO}_3$ ,  $\text{NO}_4$ ,  $\text{NO}_5$ , it is only as an example of

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\* Biot, “Histoire des Sciences,” p. 59.

the marvellous structure, the regular combinations, and the union of atoms.

Practically, when I want, for the purposes of any trade, a thorough knowledge of chemical formulas, I shall only have to study them in a good text-book, and I shall have no occasion to draw upon my schoolboy reminiscences. It is considered logical to teach young people at school the science they will afterwards require in their professions; for instance, natural science and physiology to our future doctors. The contrary principle would be more logical. A medical student can only really learn anatomy and physiology in the lecture and dissecting rooms, and he will have plenty of time for that. What is the use of giving him at school a superficial acquaintance with what he will be obliged to learn all over again? It is far better to teach the young what they will in later years have no opportunity of learning, and what they will not be compelled to learn. The doctor that is to be has far more need of a sound knowledge of mathematics and physics, of literature and philosophy, than of natural history; he wants everything that will give him an upright and elevated mind; he wants a little idealism before he becomes acquainted with the miseries of human life, and the mysteries of death. Utilitarian teaching, which makes the special profession of far too much importance, defeats its own end, and far from making men more apt for their profession, it leaves them mentally imperfect and mutilated. From a *liberal* education we must exclude all over-particularizing and all over-specializing; our first aim is to make men, and men endowed with great social virtues, not to turn out ready-made engineers, mechanics, doctors, or apothecaries. *Speciality* can only come after a sure and permanent acquisition of the general subjects of knowledge, the useful must not precede the true and the beautiful.

At any rate we should be inspired by those principles in the choice of the sciences to be taught to a student taking up literature. Astronomy, for example, is less practical,

less applicable to industry than chemistry, but it is also more adapted to excite admiration and to open out a wide perspective of the cosmos ; it should, therefore, have a place in the programme of a liberal and mainly literary education. But, as a matter of fact, the French, after having not long since introduced cosmography into the literary curriculum, are on the point of suppressing it. In the new programmes \* all the sciences but cosmography appear in single file, and a student of literature might, strictly speaking, reach the end of his studies without knowing the difference between a planet and a star, or without knowing what a nebula is.† This sudden suppression of a science by a stroke of the pen is a proof of the problematic character of the supposed "necessity" of science in education ; yesterday you might have a well-informed mind although you know no astronomy ; to-day you must know chemistry and geology instead. No doubt this is because it has been discovered that chemistry and geology are "more useful" for the purpose of forming "tellurians."

As for me, I should prefer that they turned out "cosmopolitans ;" that the child's gaze should sometimes be directed to the star-strewn heavens ; that it should be shown Sirius, Arcturus, Aldebaran ; that its thoughts should be guided through the infinities by the rays of the stars, rays that bring the future closer before us, and unveil the coming years to man ; that it should catch a glimpse in the white mist of the Pleiades, or in the Milky Way, of a dust of worlds, and in the other nebulae—of worlds perhaps yet in process of formation. If, in addition to this, it is told how human science succeeded in penetrating the secret of these clouds of stars, if it is told about Pythagoras, Plato, and Aristotle, of Scipio's dream, of Ptolemy, Copernicus, Galileo, Descartes, and Newton, condensing all the movements of

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\* *Vide* "Proposals of Commission in 1890."

† It is true that if he eventually marries a student from the girls' lycæums, she will be able to teach him cosmography, to which her master will have devoted an hour a week.

the earth into one formula, which we might write in the hollow of our hand ; if we go beyond astronomical systems and introduce it to the philosophical systems of the cosmos ; if it is told that the skies have ever been the object of the meditation of the wise ; that all have found in what an abyss of final ignorance our science is lost, and how the compass of thought multiplies our "points of contact with the unknown," as the luminous sphere of our knowledge widens ; if we add that the laws of numbers which rule the world, and make all movement intelligible, are not self-explanatory ; that as most wise men have felt, these laws should have their explanation in something analogous to our intellect, in a something present within every being, or at least in a universal effort, a universal aspiration which no doubt is striving to expand within the depths of our hearts and to become self-conscious within our thought ; that in any case, brute, lifeless matter arranged in infinitely varied figures could account for all, because there are beings who live and feel and think ; if, in a word, the teacher of cosmography did not consider himself exclusively as a functionary of the State, who, for a fair salary, has to teach from eight in the morning to two in the afternoon, that the radius vector of the planets sweeps out areas proportional to the time ; if he looked upon himself as an educator of youth—yes, even he ; if he were persuaded that a certain idealism is necessary to education, and that we can at any time come into conflict with things of the earth, earthy ; if he went so far as to tell his pupils, with Kant, that two marvels will ever fill man with admiration, the sky above our heads with its laws, and the moral law in our hearts—and that, perhaps, at bottom, these laws are identical, forming a single law which is obscure in the bright light of heaven, and dazzling in the dark depths of our consciousness ;—this disinterested contemplation of visible and invisible infinities would seem to me of greater value than a practical acquaintance with slate, sandstone, or gypsum. He is no man who has never felt the "sacred horror" of Lucan beneath the vault of

mighty oaks in druidical forests, a "sacred horror" still more impressive in the forest of stars beneath the vault of heaven.\*

Even in chemistry, in my opinion, we must only teach—at any rate to literary students—what is necessary to all, what is beautiful and admirable what is a revelation of the elementary architecture of bodies, or the universal affinity, the existence of which throughout space is revealed by spectrum analysis. Here are two programmes in chemistry; the one passes in review the whole series of elements and of their principal combinations, and describes the preparations of sulphuric acid, hydrochloric acid, nitric acid, etc.; the other, after a rapid historical sketch of alchemy and chemistry, requires an examination of principles, of the connection between chemistry and physics and physiology, notions on chemical atoms and their structure, the relative or absolute simplicity of metals and metalloids, analysis and synthesis in chemistry, the limits and possible progress of our present knowledge in this domain, the impassable boundaries of the mechanics of atoms; added to this are the principal laws of the combinations of bodies, great discoveries such as that of spectrum analysis, their theoretical and practical and even social consequences, the revolutions effected in industry by these discoveries—in a word, openings and perspectives extending in every direction far beyond the descriptions of metals, acids, or salts. Of the two programmes, which would be the more interesting, and therefore the more easy for young students? General views remain in the memory with less effort than multiplicity of detail.

At the same time, which will be the more fruitful and educative course? To appreciate this point, a simple test is at hand, to which we should always have recourse when it is a matter of judging a syllabus. Suppose the pupil at

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\* After these pages were published in the *Revue des Deux Mondes*, the study of Cosmography was replaced in the programme for students between sixteen and seventeen.

the end of his course forgets all the substance of what he has learned (which in this case is nine times out of ten); what will be left to him of the former programmes? Nothing, or next to nothing. What will he remember of the latter? The whole spirit of chemical study, ineffaceable impressions, general elevation of thought; and finally a curiosity and a longing to satisfy it when opportunity arises, a respect for and a love of science. All formulas and nomenclature will be more or less gone, but a progress of thought will remain and persist, and finally a scientific aptitude quite ready to manifest itself if circumstances compel the youth to learn anew, and this time to retain the science of which he has forgotten the letter and kept the spirit. We may therefore say that chemistry, interpreted in a certain way and taught by a certain method, becomes a moral and even social science instead of being purely material; it becomes a *humane* science instead of being the knowledge of brute objects; and it is thus alone that it, with all other sciences treated in the same way, can take its legitimate rank in the "humanities." The highest aim of liberal education is to excite admiration; nothing, except it be absolutely necessary, should be taught to humanists if it is not admirable: *πολυμαθία νόον οὐ διδάσκει*.

Now what are the necessary sciences? Some sciences are capable of explanation, others are not at all, and others but imperfectly so. Thus mathematics and mechanics are perfectly explanatory; their analysis and synthesis reach as far as possible and give the sentiment of the inevitable, for what cannot be, is not. Effect is connected with cause and everything is luminous, transparent to the mind. Physics also may in a great measure be explained; there are complete theories—such as the theory of dew—which communicate the sense of necessity. With chemistry we begin to have no explanations. Why do oxygen and hydrogen in chemical combination make water, and how? We do not know, nor can we from the properties of the ingredients deduce the properties of the compound. We state the phenomenon

by saying *so and so is the case*, or we produce it and say *so and so is going to happen*, you will see the hydrogen and oxygen combine and form water. "In chemistry," says M. Berthelot, "our power goes further than our knowledge." The other branches of natural science again are much less susceptible of explanation; life is still a mystery. To ascertain is not to explain. If we open a germinating grain of corn and totally destroy it, we are not grasping the great law of life, the secret of universal germination. The very functions of life can only be imperfectly explained. Why has the brain two hemispheres, and why is it constructed as it is? Why has this flower five petals and not six? Why has this soil one composition and not another? Here there is more and more of statement, description, relation. The really scientific part of natural history is beyond the scope of secondary education; the descriptive part is either too elementary or quite useless. Nature turns her kaleidoscope before us: we are content to note the figures as they succeed one to the other, an eglantine after a violet or a primrose, a lion after a tiger or an elephant.

But what is the use of giving the young a description of "games of love and chance"? We must say enough to awaken their imagination, to arouse admiration and curiosity; the rest is superfluous, being at bottom neither scientific nor philosophical. Education, therefore, as a profound and methodic study, needs only two typical sciences, the methods of which are equally typical, the one deductive, the other inductive—mathematics and physics. These are almost the only sciences which give opportunity for problems as well as note-taking, and consequently afford a mental exercise in their solutions. If it is true that practice makes perfect, the scientific spirit will not be acquired in sciences which leave the pupil nothing to find out or do for himself. It is to be regretted that in physics, experiments are not carried out by the boys themselves; but in spite of this, physics, the inductive science, *par excellence*, is the necessary complement of the deductive science—mathematics.



Again, even in mathematics and physics, we must confine ourselves to the fundamental principles and have them thoroughly learned. In Latin, after the three hundredth piece of translation, the pupil will certainly have had his mind more exercised than after the ninth; from Cornelius Nepos or Sallust, he will have gone on to Tacitus and Virgil; he will have solved a series of problems consisting in the discovery and expression of the thoughts of great writers; and he will have a wider knowledge of both Latin and French. But will a boy be more intelligent after his three hundredth theorem in geometry? Will his mind undergo a metamorphosis because he has proceeded to the ellipse after he has studied the circle? Will he be a different man because he has mastered simple equations and gone on to equations of the second degree? No, for, strictly speaking, from one theorem to another it is always the same. And will there be any intellectual progress in passing in chemistry from sulphur to iodine? or in botany, if we study the rubiaceæ and afterwards learn the characteristics of the primulaceæ? or if, after examining pieces of quartz, we go on to pieces of chalk?

The fact is that science-teaching, with its list of facts and laws linked together by no philosophical connection, only apparently causes mental progress; in reality the pupil is "marking time" on the same spot. It is just as if after having quoted a single instance of something, we were to proceed to give a thousand. This is not the case with moral science. If after having studied the laws of the sensibilities and of the passions we go on to those of the will and of the intellect; if we pass from logic to morals; if we raise ourselves to considerations on the nature and worth of existence, it is clear that we are not only advancing but ending. If in political economy we study the laws of production and then the laws of exchange, we obviously will have a more complete idea of the sources of wealth; if politics after investigating the dangers and advantages of a monarchy, we turn to the dangers and advantages

of democracy, we shall find our minds more accurately orientated than before. If in aesthetics we turn from the strength and weakness of idealism to the strength and weakness of realism, from different styles of poetry to the plastic arts and to music, we shall certainly find our taste more enlightened and our ideas broader. The moral and social sciences are a perpetual ascent; this is not so with mathematical and physical sciences unless they are studied on their philosophical, moral, and social side.

The school of Comte has based its pedagogy on the division of science adopted by their master—general and special sciences, for instance. General physics as opposed to meteorology, comparative anatomy as opposed to descriptive natural history. The number of the general sciences is infinitely less than that of the special sciences; and further, they also have that invaluable property for teaching purposes (as Comte tells) of condensation as far as is necessary, without a consequent losing sight of their double character of precision and generality. A few pages are enough for a clear and practical explanation of the acquired doctrines constituting “the higher expression and ultimate limit of human knowledge. This principle is a true one, and that is why our scientific teaching, instead of being swamped in the descriptive sciences—mere fugitive exercises of the memory—should keep to the general theory of science, illustrated by a few well-chosen applications.

II. Not only should the study of science be simplified on the lines I have now laid down, but it should be unified. The means is at hand, and forces itself upon our notice; the connecting link of the various sciences can only be philosophy. Two things are necessary. First, we must introduce into the study of each science the philosophic spirit and method, general views, the search for the most general principles and conclusions; we must then reduce the different sciences to unity by a sound training in philosophy which will be as obligatory to students in science as to students in literature.

The young only follow their master when they see the end in view and outlets issuing therefrom ; if we cannot and ought not to make them see the practical application of each truth, we must make them see, so to speak, its theoretical application, *i.e.* its place and importance in the system of human knowledge. Science can only be thoroughly taught to the young by men of philosophical temperament, who will always see the part in the whole, and who will never lose sight of the hierarchy of truths.

First we must show the human side of science, the part played by the mind in its construction and in its discoveries ; *i.e.* the method of each science, which is an application of general logic, should be the object of individual and attentive study. Moreover, the logic would not be entirely abstract, for it may be accompanied by the great examples afforded by the history of science. Scientific truths, said Descartes, are battles won ; describe to the young the principal and most heroic of these battles ; you will thus interest them in the results of science, and you will develop in them a scientific spirit by means of the enthusiasm for the conquest of truth ; you will make them see the power of the reasoning which has led to discoveries in the past, and which will do so again in the future. How interesting arithmetic and geometry might be if we gave a short history of their principal theorems, if the child were mentally present at the labours of a Pythagoras, a Plato, a Euclid, or in modern times of a Viète, a Descartes, a Pascal, or a Leibnitz ! Great theories, instead of being lifeless and anonymous abstractions, would become human, living truths, each with its own history, like a statue by Michael Angelo, or like a painting by Raphael.

At the same time, each scientific truth would have its morality. "Believe me," says Tyndall, "a self-renunciation which has something noble in it, and of which the world never hears, is often enacted in the private experience of the true votary of science." "Science," says Huxley, in his turn, "prosperes exactly in proportion as it is religious ;

Truth has yielded herself rather to their patience, their love, their single-heartedness, and their self-denial, than to their logical acumen." Lastly, in Spencer's words, "Devotion to science is a tacit worship; . . . it is not a mere professed respect, but a respect proved by the sacrifice of time, thought, and labour."

This could not be better expressed, but here the writer is dealing with active discovery, and not with passively transmitted truth. Yes, the development of science and the progress of method is an epic, and it is far more important for the education of the young to be interested in this epic than to make them enumerate and write out lists of facts or laws. Science has an intrinsic poetry of its own; a Goethe, at once philosopher and poet, has no difficulty in finding this out, but our scientific instruction neglects to make understood and felt the poetry of science, which is blended with its very logic and with its history.

Besides the human and logical side of science we should exhibit its general and cosmological features. For that purpose, we must systematize the great results of different sciences, and make their connection clear. The really *scientific* part of science is the inter-connection of causes, and at the same time this is its beautiful, its interesting, and its educative side. The history of the objects, the causes of which we see linked together, becomes a fragment of the history of the world, and *ipso facto* of our own history, because we are a part of the great whole—the intelligent part, namely, that which understands the causes. The individual mind is only satisfied by the connection of things with the universal, that is what gives it its grandeur, and this ideal link we may hope to seize with the mental eyes. Who will be so indifferent as to be uninterested in the cosmic system? That is where the real liberal value of scientific studies lies; they should give us an idea of the universe and of its great laws, of what the ancients called the *cosmos*. The part played in the universe by numbers, by geometrical forms, by motion, is as interesting to the

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mind as the particular study of a theorem in arithmetic and geometry is dull. If you are not continually widening the mental horizon of your boys, what interest can they take in the extraction of a square root or in a tangent to a circle? We must "Pythagorize," in the best sense of the word, and "Platonize;" we must reveal to them the elementary æsthetics in numbers and figures; we must show them how numbers rule the world, and how figures in space unveil to us the universal plan. In a word, we must show them both the human mind and the universe; apart from these two terms a scientific truth loses its interest and its scope; it can only have a practical and industrial interest.

III. In the first "cycle" of education, which is still almost primary, the descriptive natural sciences have their place. In the second cycle, which is expressly secondary, the typical sciences must be taught, and they are two—mathematics and physics. They are the only essential sciences and the basis of all the others. Chemistry already is, in a great measure, superfluous. Botany is scarcely any use, and geology even less; zoology should only reappear in the third cycle, which is semi-superior. At this stage general *biology* must be taught, the general laws of life and its evolution must be learned. In a word, the education in the natural sciences is either primary or higher; it is not properly secondary at all, or, at least, only its general theories and philosophical conclusions enter into secondary education. Every boy who has received a sound education in mathematics and physics possesses the instrument necessary for the study of science; the rest is only a matter of time, memory, and practice. Correct it also by Latin and his native literature, by a sound training in philosophy, by general notions of history, and you will secure the selection and development of scientific minds, and that by precisely the same means employed in the selection of literary minds. To mathematicians with a literary and philosophical training

the rest of the sciences, with their technical applications, will offer no serious difficulty.

In France we are too much enamoured of uniformity—a false conception of unity—and we cannot in secondary education distinguish the immovable foundations—true humanities—from that which varies with the individual aptitude. For my own part, I should prefer unrelenting severity as far as the common foundations of classical education are concerned: the mother tongue, Latin, morals and philosophy, the history of civilization, the elements of mathematics and physics; and tolerant and flexible regulations with regard to Greek, modern languages, details of history, and details of geology, chemistry, cosmography, zoology, geography, etc. Do not ask parents to devote their children to a special career before they are thirteen years of age. Simply ask them if they want their children to be at their studies to nineteen, or even, in higher education, to twenty-one. It has been said that this is “the only question within the reach of all, and the parents alone are able to solve it.” Then we might organize a unique system of secondary education with ramifications, final but simple, and determined by the aptitudes and by the tastes which have already shown themselves in the course of studies, by the forecast, as it were, of the future career. We might leave, in the last years of school-life, a certain latitude in the choice of special courses, joined to inexorable rules with regard to common and essential courses. If a pupil has in view the higher technical schools, he will only have to improve his scientific training by the choice of an appropriate course. He will do less Greek, less history and geography; he will not follow a course of literature, etc., but he will continue his work in Latin, his mother tongue, and philosophy. Although prepared for, say, an engineering school, he will, in fact, be none the less adapted for any liberal profession. With his Latin, the literature of his own country, philosophy, and the theory of science, he may become, with the proper complement of special study, a good magistrate or a good

engineer, a good teacher or a good officer. His mental horizon will not have been narrowed down by the servile fashion of learning science, which is the preliminary "cookery" for our State schools. Would these schools lose if they were filled with men whose minds are really cultivated, complete, conversant with all that is great and noble in the mind, able to write good English or French, and in touch with most literary, moral, social, and philosophical questions?

In a word, strengthen the position of science by restricting it to what is fundamental for all, strengthen in the same way and by the same means the study of English and Latin literature, of general history, and of philosophy; give boys in their last years of school-life the choice between going on with their Greek or the study of a special branch of science; this would be the shortest way of maintaining the fundamental unity of secondary education; the same sap would nourish the whole tree, and the highest branches alone would be treated differently. This would produce a real equivalence between a literary and a scientific matriculant, from the point of view of moral and intellectual culture.

In France, teachers of science, whether elementary or a special branch, are perforce compelled to undertake the work of "coaches" when they should be educators. They do not teach science, they teach how to pass examinations, with the aid of all the petty traditions for that purpose. Thus pupils and professors alike are condemned to a vulgar utilitarianism. The different State schools have a false idea of really scientific education, for they take as their criterion quantity rather than quality. As Vauvenargues said, "we must not judge men by what they do not know, but by what they do know and how they know it." The justification given of these long programmes is not that all these subjects are necessary, but that the requirements must be multiplied so as to select the most capable men, and to eliminate the rest.

Now, these long programmes actually test nothing but the memory, and are no real test of capacity. Can there be anything more illogical, not to say more immoral, than to

replace the appreciation of solid merit and good work by the machinery of a lottery? If you want selection because of the numbers of your candidates, an easy way is within reach—examine them in letters and philosophy. You may get candidates knowing less chemistry and physics, but you will certainly get men who will in the long run do you far more credit than men whose culture is less complete. In great schools, as elsewhere, “heads well made are better than heads well filled.”

IV. It is not enough for the teaching of science to be animated by a philosophical spirit; it must have its complement, and, in a measure, its counterpoise, in a sound training in philosophy.

Secondary instruction has two main aims; it must, in the first place, furnish those who will not pursue their studies after school-life with a culture that is sufficient for the functions of private life, the family, and the State; in the second place, it must give to others the knowledge that is necessary for them to profit by higher instruction. Now, philosophy is essential for the introduction of unity among the different branches of science, among the different branches of literature, and finally, between science and literature, between natural laws and social and historical laws. From this unity alone springs a scientific conception of the world and a higher rule of conduct for those who do not pursue their studies further. Secondary education must make towards a philosophy of nature, and a moral and social philosophy. Without these it remains anarchic, divorced from its principles, from its consequences, from its aims; it is analysis without synthesis, or, as Aristotle would say, a bad drama made up of episodes. Philosophy is therefore essential to all who have to be contented with secondary instruction; they must carry away from their studies general conclusions as to nature, and the laws and ends of individual or collective existence. Moreover, moral and social science is the only science that is of itself educative, because it



furnishes our highest faculties with both exercise and nourishment; all other science should, therefore, tend towards it. By the simple word *science* the French, says Dubois-Reymond, understand the sciences of nature (*Naturwissenschaft*), and by the simple word *Wissenschaft* the Germans understand mental science (*Geisteswissenschaft*).

Besides, philosophy is the only training in which the pupil is active as long as he is listening to his master, instead of becoming a "mechanical notebook." We cannot thoroughly learn psychology, logic, or ethics without understanding them; we cannot understand them without in a measure re-constructing or re-thinking them, without self-reflection and continual mastery in our consciousness of the words of the teacher; instead of being passively present at a material experiment, as in a lecture on physics, or listening to a description of anatomical pictures, as in a course of natural history, the student of philosophy is continually compelled to refer to his inmost experience, to his personal recollections, to what he has seen, heard, or felt. The master, too, questions him in the maieutic method of Socrates. According to D'Alembert, two things are necessary to acquire sagacity, the best of mental qualities—"self-exercise by rigorous demonstrations, and *not to confine one's self to it*." We must first accustom ourselves to the recognition of the truth in all its purity, to be able to afterwards distinguish it from what is more or less near it; but it is to be feared that "the too vigorous and continuous habit of absolute and rigid truth dulls the sense of what is not truth." Ordinary eyes, habituated to brilliant light, no longer are able to distinguish the gradations of a weaker light, and only see thick darkness where others catch a glimpse of faint brightness. Hence the contempt of certain *savants* for philosophers. However, "the mind which only recognizes the truth when it is directly affected by it, is far below that which not only recognizes it when close at hand, but can detect it at a distance by its fugitive characteristics." We must, therefore, accustom ourselves to passing without diffi-

culty from light to dusk. In moral and social life we are dealing with the uncertain; what is, in my opinion, important, is, therefore, not so much the acquisition of knowledge, as the art of divination, the sense of the beautiful, of the good, of the "becoming." Every education leaving this sense undeveloped may perhaps turn out artisans, but it certainly will never make men and citizens.

On the other hand, philosophy is no less necessary to those who will eventually receive a higher training. In fact, higher education in itself is a specialization—law, medicine, science, history, literature, philology, theology. All students in the higher courses are not compelled to follow a course of philosophy; and, besides, philosophy in higher education can no longer take the form of a regular and complete course; it itself specializes; and to be fruitfully pursued, the study of the particular question specialized needs a preliminary acquaintance with the whole field of philosophy. To count on higher education to initiate young minds into philosophy is, therefore, a mere chimera. And, further, young men who proceed to higher work without a preliminary philosophical training are unable to use to the best advantage the instruction given them. They have no criterion, no general views, no way of combining and coordinating their special studies into a conception of the world, of life, and of society. Their so-called higher work will really remain inferior work; they will be workmen in physics, chemistry, history, literature, etc.; but they will not have that elevated, disinterested, liberal, and universal spirit which should be the spirit of the *universities*.

Men of science more than any others should know the limits of science. They are led, in fact, either to step over the bounds of knowledge in their assertions, or to introduce into science itself metaphysical hypotheses. Science tends to become, as it were, a new divinity, whose prophets are the *savants*, and whose worship has its fanatics. Kant inaugurated the era of our modern philosophy by criticizing our means of knowledge, and by laying down the boundaries

beyond which knowledge cannot pass ; *altes terminus hærens*. The principal German scientists are saturated with the critical spirit, and in their writings they are fond of showing us where our knowledge must stop. The magnificent addresses of Dubois-Reymond on the limits of natural knowledge and on the seven enigmas of the world will occur to the reader, with those of Virchow, Haeckel, and Naegeli on kindred topics. In England, Tyndall's address on the limits of science has become a classic. Do not leave the young to the exclusive study of science, and to the pride this study may develop, without showing them the points on which we must say with the modesty of Socrates of old, "What we do know is that we know nothing." One of two things befalls all men of science who have received no philosophical culture ; they either remain in an attitude of complete indifference and positivist scepticism, or they fashion a more or less novel philosophy for themselves. The lucubrations of more than one old pupil of the École Polytechnique show us that the geometrical spirit is far from excluding the spirit of chimera.\* The young man must therefore receive from philosophy an explanation of the facts of science already known to him, a rule for higher scientific research, and finally a view of the limits beyond which scientific knowledge cannot pass, and beyond which lies the realm of belief.

Philosophy was not long since suppressed in France for the sake of those boys who were preparing for a scientific career, or for the great schools. Now these are precisely the lads who have most need of philosophy, for, as we have seen, moral and æsthetic culture is especially necessary to our future *savants*.

To sum up,—the teaching of science should be organized with a view to general culture, and so as to form by itself a real system of humanities. At the same time, it should secure the selection of scientific capacities, and thus prepare

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\* Victor Considérant, to quote only one instance.

for the nation the *élite* of scientific men it needs. To attain this twofold object, it is not the quantity of knowledge acquired that is to be considered—and that is the blunder committed by those who have drawn up the various programmes for examinations. The important thing is the quality, the method, and the organization of knowledge. The quality of knowledge consists in its being rational instead of being mechanical and merely mnemotechnical; the method must be active and philosophical; the organization must tend towards a philosophy of nature and a philosophy of manners. Vogt tells a story of the clock-maker of Strasbourg. The town council, fearing lest the great constructor of this *chef d'œuvre* should make a still more wonderful clock for some other city, determined to put out his eyes. He asked as a last favour to be allowed to see and to touch his clock once more. He went up to it and took out a little "collar." Then the savage deed was done. But the clock would not go; its wheels revolved all right, but they had been thrown out of gear. The study of science without philosophy produces a similar effect on the brain; the cerebral wheels turn round each in its proper place, but they are out of gear, and the hand does not mark the hour. All unity has disappeared; it is a machine the easier to put out of order the more complicated it is. The little collar which would keep everything in its proper direction is missing, and the so-called scientific education becomes intellectual infatuation. True education should form an organism, animated throughout by the same spirit, regulated by the same method, tending to the same end. The different sciences should be taught not for themselves, but for the whole of which they form a part, for *science*. They should therefore be linked together instead of following one another in the disorderly sequence of a modern syllabus, and their connection should be of such a character as to ensure the progressive development of a conception of nature and life. They should, in spite of the diversity of their objects, exhibit in process the only and identical evolution

## BOOK III.

THE CLASSICAL HUMANITIES FROM THE  
NATIONAL STANDPOINT.

EDUCATION is the development of the mind subject to the laws of all evolution, individual or collective. Hence the problem recently proposed in Germany and in England : Does the doctrine of evolution justify a study of the classics from the twofold standpoint of individual and of national development ? The answers are very varied, both in England, where Spencer and Bain attack the study of Greek and Latin, and in Germany, where Preyer, Haeckel, and Goering reject the classics and Vaihinger defends them.\* In France, curiously enough, Latin and Greek are attacked from the rear by most of the pure *littérateurs*, and by rhetoricians who have become journalists, like M. Frary ; they are advocated, on the other hand, by philosophers such as MM. Ravaisson, Renouvier, Renan, Lachelier, Guyau, Rabier, and many others, as well as by literary critics with philosophical views, such as M. Brunetière. The same discussion has been going on in Italy, where a distinguished philosopher, M. Fornelli, has just published a very complete defence of classical education.† The question, apart from its speculative importance, is not only of scholastic, but of national

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\* "Naturforschung und Schule."

† "La Pedagogia e l'Insegnamento Classico."

and international interest. It is not enough to discuss—as in most cases the disputants are content to do—the intrinsic value of this or that subject considered in itself; we must estimate its relative value and place in the whole, its influence on the development of the national mind, and finally its greater or less utility in the maintenance of national in contact with foreign influences. A nation intent upon its future can neither abstract itself from its own past, nor from its present relations with other nations.

After a preliminary word as to the very general applications made of the theory of evolution in pedagogy, I shall endeavour to show that our choice must be determined by national evolution, and not, as Spencer assumes, by human evolution alone.

## CHAPTER I.

*OF THE PARALLEL BETWEEN HUMAN EVOLUTION AND  
INDIVIDUAL EVOLUTION.*

THE principles of evolutionary pedagogy, so skilfully handled by Vaihinger and Preyer and Spencer, are the following : (1) Man, the final result of zoological evolution, comprises in himself the preceding forms of life, according to "ontogenetic and philogenetic laws," *i.e.* according to the conditions of the genesis of the individuals of the race ; (2) Man is subject to physiological and psychological heredity ; by the exercise of those faculties he develops his inherited energies in the social environment, and transforms them into equivalents of a higher order ; (3) Man has a life that is not merely individual, but collective ; individuals and the community are mutually blended. If social life may be considered as the result of the lives of individuals, it is equally true, on the other hand, that the development of each individual may be considered as the effect and average of the social organism. Consequently, pedagogy can only become a science in so far as it is based on "physio-psychology" on the one hand, and on sociology on the other.

The following famous law was laid down as a basis for the science of education by Auguste Comte : "Individual evolution should be in conformity to collective evolution." In this somewhat vague form, the fundamental rule of evolutionistic pedagogy may certainly be justified. The development of the individual in every scale of the animal kingdom, passes through the principal stages through which

the species has passed; we know that the successive stages of the human embryo present us, in brief, with the history of life on the earth and succession of its principal forms. The laws of heredity show that a certain conformity of individual development to the development of the species is inevitable; each individual is, so to speak, a particular specimen in which are to be found the essential features of the race. From the point of view of education, if the development of the individual and that of the race proceed along the same lines, the former will be accomplished with greater facility, because it will be more in conformity with the hereditary adaptation of the brain. Finally, the harmony of the individual and collective development is justified by the very end education should have in view, which is, strictly speaking, the subordination of the individual to the ends of the whole community. The individual must realize in himself the social ideal; he must be the community in miniature, not only as it is, but as it should be and as it tends to be. In a word, man must live the life of humanity as a whole, and must therefore be doubly a man.

But, if the general principle of evolution is applied to the education of youth, it must be carefully interpreted as we pass on to particular consequences. According as we are seeking conformity, especially in individual education, to the past evolution of humanity, its present state, or its future evolutions, we have three roads open to us; there is, so to speak, a struggle between the past, the present, and the future. The problem of education is to conciliate these three points of view. In my opinion, the most important is conformity to the ideal of future humanity; harmony with existing humanity is the first means of attaining this end, and harmony with past humanity is a second but more indirect means. On the latter, previously advocated by the pedagogic school of Herbart, Vaihinger has laid most emphasis. "The history of the gradual evolution of humanity is called in these days the history of civilization. We may therefore deduce from the fundamental law of the



genesis of life, the law of mental genesis, formulated as follows: the intellectual development of each single individual should be a summary of the historical pages of the culture of humanity." \* "Whoever wishes to attain to the level of our present civilization," wrote Ziller, a Herbartian, "must pass through the same stages of development as humanity in the progress of its culture." From this Vaihinger deduces the legitimacy of classical education, independently of any reform in it that may be considered desirable.

This is going rather too fast. How can we pass immediately from a physiological law to a very general mental law? Let us now see contradictory deductions drawn from the same general principles. Vaihinger concludes in favour of a classical education; Spencer in favour of a scientific training—illogically, in my opinion. As for Ziller, he invented his famous system of *concentration*, i.e. he took each year an historical period as a centre, around which all other subjects were grouped—even natural history, drawing, and geography. For example, with third year of school-life, the history of the patriarchs; fourth, the judges of Israel; fifth, the kings of Israel; sixth, the life of Jesus; seventh, the apostles; eighth, the Reformation.

However, there is a profound truth in the law of parallelism between individual and collective development; but we must first apply this law to the method and general spirit of education. Method should proceed from the simple to the complex,† from the easy to the difficult, from the concrete to the abstract; it should also reproduce the characteristic of *spontaneous activity* presented by the development of humanity, so that the child can find out as much as possible by itself, and, by acting and thinking, experience the pleasure of acting and thinking. But we cannot allow that for this purpose it is necessary for the

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\* Spencer, "Education," § 4, p. 75 (Tr.).

† *Ibid.* p. 73, *et seq.*

child to go through all the intermediate and historic stages through which humanity itself has passed. Moreover, it is by no means certain that the mental state of a civilized child is identical with, or at least analogous to, that of the infantile phase of humanity. Even supposing the analogy existed, we may fairly ask if education should undertake to second the child's barbarous and savage tendencies, if it should not rather correct them by the aid of thousands and thousands of years of civilization. In fact, naturalism in pedagogy takes no account of two essential elements which present the methods of education from being identical with those of spontaneous development ; namely, language and literature.

Language is a product of the accumulated reasoning of man, and also of man's observation and reflection. Learning to speak is an advance in mental evolution with all the acquired rapidity of centuries ; it is flying with the wings obtained by the human intellect, just as the bird when it leaves the nest for the first time flies at once with the wings acquired by the race ; it is a profiting by all the selections and by all the victories which have marked the struggle for existence throughout the ages. To language add literature, which has been rightly called "humanity in miniature," and the evolution of the individual mind will be still further accelerated. All the gropings in the dark, the errors and defects of thought, are at once suppressed, and the child is transported to the goal without having gone through the intermediary stages. We only take the trouble to be born, and we become a man, an Englishman or Frenchman ; so, if we only open a book we can ride roughshod over centuries, and we may find ourselves further advanced than Euclid, Descartes, Leibnitz, or Newton. The disciples of Spencer declaim in vain against books and "book learning ;" the answer is that a distinction must be drawn between the first education and the second. We should not allow books to be abused while the child is still young, for its spontaneous development should be respected ; in the second

stage the book is the very basis of instruction ; it establishes an evident contrast between spontaneous and artificial education. In a word, there are two factors in education—nature and civilization ; books are the second factor, in these days more powerful than ever—they may be called the *social* factor. Books are social evolution at once fixed and accelerated.

It follows from the preceding remarks that the parallel between the individual and the race should be only brought to bear on very general faculties and their legitimate use. It may also be granted that there are general mental states through which the individual passes, just as humanity passed through them. Comte proposed, in virtue of this doctrine, that we should rise professedly from the theological or imaginative stage to the metaphysical or abstract, and thence to the scientific or positive. The theory of the three stages may be doubtful, but the principle is a true one, and it is certain that education is a series of "mental states," a development of the collective mind within the individual. The mind, like the body, has its ages ; we cannot expect an old head on young shoulders.

If, from the subjective point of view of the faculties to be developed, we pass to that of the objects of instruction, the law of parallelism still obtains. There are groups of objects with which humanity is familiarized by a gradation which is also imposed on individuals. But these are only general results, and, so to speak, the general forms of knowledge which should be in turn reflected in the mind of the young. The laws of physiological development support the theory, for what the individual reproduces successively in his evolution is only the *typical* intermediary forms, and consequently the successive syntheses in which the stages of progress were recorded. Plato would have said that these are ideas successively realized. Like scientific instruction, literary and historical instruction must proceed by syntheses, *i.e.* by the successive recognition of the great typical forms of the human mind in their good, beautiful, and durable

aspects—and that in the order of successive appropriation by the child's mind.

Spencer, with Vico and Comte, asserts that we must proceed from sensible observation to reflection, from the empiric to the rational, from the simple to the complex; in morals even, he recommends starting from a low ideal, within the child's mental reach, and not exacting from them a moral precocity as dangerous in its way as physical precocity, a precocity which, if we take instances of prodigies of juvenile virtue, may produce in the long run mediocre or even vicious men.\* Why does not Spencer apply the theory of evolution to intellectual education? Why does he expect from the child a scientific precocity which would be as detrimental as moral precocity? Why does he not recognize that between the great classics (particularly those of humanity in its early days) and the imagination of youth, there is a kind of harmony and "adaptation"? If the child should be progressively introduced to the ideas and sentiments of the race, if these ideas and sentiments are fixed in language and literature, it follows that the study of letters is the great introduction to morals and to social science. How can we expect the child by an entirely spontaneous evolution to find for himself the thoughts which have become a human and national inheritance? To find new ideas and new sentiments is nothing but the act of genius. Genius, like nature, creates; genius proceeds from depth to form, from bird to flower; the child can only pass from forms to depths to penetrate little by little the secrets of life and thought. To cultivate letters first and science afterwards, is to pass from imagination and sentiment to reasoning, from the concrete to the abstract, from general to special knowledge, from the complete to the partial exercise of the mind, from what acts on the heart and even on the character, to what only acts on the understanding or on the memory. The child's intelligence, at the outset of its

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\* Spencer, "Education," pp. 73, 135 (*Tr.*).